AIDS TO SURGERY EXAMINATION

version 2.0

SHORT CASES

OPERATIVE SURGERY

Dr. K P SINHA
Dr. Deepak Kumar

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Version - 2.0

By

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PREFACE

The aim of this book is not to substitute a standard text book of Surgery. Its very purpose is to garnish the overall knowledge of a final year student who is preparing to appear in the Surgery examination.

This book has been written in lucid and easy to understand language. This will enable the average student to revise his overall theoretical knowledge in Clinical surgery, which will prove invaluable in the examination, pertaining to **"Short Cases"** that are commonly encountered during the examination, including the orthopaedic cases.

To make this book more comprehensive additional section has been devoted to **"Operative Surgery"**. All this makes this book not only **"Precise and Concise"** but also an absolute necessary **"Hand book"** during the examinations.

I would like to extend my gratitude to **Prof. Om Prakash, Prof. Diwakar Mishra, Prof. M. L. Agrawal** and **Prof. A. Q. Siddique** for their invaluable advice and suggestions.

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Dr. K. P. Sinha
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SHORT CASES IN SURGERY

Short cases form important part in the clinical examination. What follows is an outline of discussion of various cases which are commonly encountered in clinical practice and undergraduate and post graduate examination halls. For more details the students should consult standard text books of Surgery.

In short cases, the students are not required to take detail history, but confine to detail local examination (Inspection, palpation, percussion and ascultation). However, in selected cases, examiner may ask questions regarding onsent, duration & progress of the disease.

It is important to avoid presenting irrelevant information. At the end of the presentation, there should be only two or three differential diagnosis, presented in the correct order of more probable one first. Never argue with the examiners.

I. LUMP OR SWELLING

A. SKIN AND SUBCUTANEOUS TISSUE

1. SEBACEOUS CYST
(Epidermoid cyst)

It is a RETENTION CYST of Sebaceous gland, developed due to obstruction of its duct.

Common sites :

- SCALP, FACE, SCROTUM, neck, shoulder and chest.
- Globular or spherical in shape.
- Has a bluish spot called PUNCTUM, the site where it is adherent to the skin. In many cases punctum may be absent but FIXITY TO SKIN at some point must be present (c/f Dermoid).
- Area surrounding the sebaceous cyst of the scalp is bald probably due to interference of its blood supply.
- Sign of INDENTATION is present, as it contains yellowish white poultice like material.
- Its lining is superficial squamous epithelium (Epidermoid cyst).

D/D :

Dermoid cyst, Lipoma, Neurofibroma.

Complications :

1. **Infection.**
2. **Ulceration**—Ulcerated, infected sebaceous cyst, specially situated over the scalp. Resembling an Epithelioma is termed COCK'S PECULIAR TUMOUR.
3. **Sebaceous horn**—Due to drying up of slowly escaping sebaceous material.

Treatment :

Surgical excision, usually under local anaesthesia. Wall of the

cyst must be removed by complete excision, or avulsion of the cyst wall (in pieces) otherwise recurrence is probable.

2. DERMOID CYST

I. SEQUESTRATION DERMOID (Inclusion dermoid) :

It develops due to inclusion of primitive ectodermal cells at the time of embryonal fusion.

Sites : In the MID LINE, scalp (OUTER CANTHUS OF THE EYE), root of nose, mid line of neck, branchial cyst.

Clinically : It is spherical or ovoid in shape, smooth surfaced, nontender, fluctuant, non-compressible and non-transilluminant. Dermoid over the scalp may have intra cranial extension. However, impulse on coughing may be present provided the opening is large. X-ray shows bony defect. SKIN IS USUALLY FREE.

It is lined by squamous epithelium & the wall contains dermal elements (e.g.—hair roots etc), c/f sebaceous cyst.

D/D : Sebaceous cyst, Lipoma, Neurofibroma, Meningocoele (External angular or root of nose).

Treatment : Excision of the cyst. Scalp dermoids having intracranial extension may need osteoplastic craniotomy.

II. IMPLANTATION DERMOIDS :

It develops from squamous epithelium driven into deeper tissues and implanted beneath the surface, as a result of accidental or surgical trauma (common in tailors—needle prick injury). Common sites are tips of fingers, palms and soles. It contains white greasy material. Clinically it is a tense, smooth, usually nontender cystic swelling.

Treatment : Excision of the cyst.

III. TUBULODERMOID :

It develops from non-obliterated portion of a congenital ectodermal duct e.g. thyroglossal duct, ependymal cyst, post anal dermoid.

IV. TERATOMATOUS DERMOID :

It develops from totipotent cells, lined usually by ectodermal cells. They are found commonly in the ovary, testis, mediastinum,

retroperitoneum and the sacral area. It contains hair, teeth, cartilage and/or bone. Malignant change can occur.

3. LIPOMA

It is a BENIGN TUMOUR OF FAT CELLS. They occur anywhere in the body (UNIVERSAL TUMOUR) except in palm and sole. It may be encapsulated (commonest) or diffuse. Depending on the presence of additional tissue, it may be a fibrolipoma (fibrous and fatty tissue), neurolipoma (nervous and fatty tissue) or naevolipoma (excessive vascular tissue and fatty tissue). Depending upon the sites, Lipoma may be subcutaneous (commonest), subfascial, subsynovial, intra articular, subserous, submucous, inter muscular and intra dural.

Dercum' disease (Neurolipomatosis) is characterised by painful deposits of fat mainly on the abdomen, back and thigh.

Common sites :

Head & neck area, back, thighs and abdominal wall.

RETROPERITONEAL LIPOMA (D/D Hydronephrosis), and large lipoma of thigh and shoulder sometimes undergoes myxomatous degeneration or becomes MALIGNANT (Liposarcoma).

Clinical features :

Subcutaneus lipoma is the commonest of all. It is a SOFT, LOBULATED, NONTENDER, PSEUDO FLUCTUANT (Whole mass is displaced while testing for fluctuation), AND THE MARGIN SLIPS UNDER THE PALPATING FINGER.

D/D :

Neurofibroma, Sebaceous cyst, cold abscess.

Treatment :

Lipoma causing symptom or even for cosmetic region should be excised under anaesthesia. Resultant cavity may be drained to avoid haematoma formation & subsequent infection.

4. NEUROFIBROMA

It is a BENIGN TUMOUR arising from the NERVE SHEATH.

(a) Localised or Solitary Neurofibroma :

It commonly arises from the PERIPHERAL NERVE

(subcutaneous) or from the MEDIAN or ULNAR nerve above the elbow or 8th cranial nerve (ACOUSTIC NEUROMA).

Neurofibromas are not encapsulated, and are composed of spindle cells, with elongated serpentine nuclei.

Clinically : It is SMOOTH, FIRM, MOBILE WITH WELL DEFINED MARGINS and MOBILE in a direction perpendicular to the axis of the involved nerve.

There may be pain, paraesthesia and weakness in the distribution of the nerve.

D/D : Lipoma, sebaceous cyst, fibroma.

(b) Generalised Neurofibromatosis (VON RECKLING HAUSEN'S DISEASE) :

There are multiple nodules in the skin all over the body. It has an autosomal dominant mode of inheritance with a positive family history in 50% of cases. CAFE-AU-LAIT spots (pigmentation) are often associated. Malignant (sarcomatous) changes may occur only in Von-Reckling Hausen's disease in about 5-13% of cases.

(c) Plexiform Neurofibormatosis or Patchy Dermatocoele :

Usually the 5th cranial nerve (Trigeminal) is involved. The affected nerve is enormously thickened with the thickening, oedema and pigmentation of the overlying skin. Sometimes the OVERLYING SKIN MAY BE DRAWN OUT AND FOLDED.

(d) Elephantiasis Neurofibromatosa :

Usually the lower limb is affected. The skin becomes coarse, dry and thickened along with the thickening of subcutaneous tissue.

Complications : Pain, Paraesthesia, ulceration, malignant change (Neuro-fibrosarcoma).

Treatment : Subcutaneous neurofibroma CAUSING SYMPTOMS may be excised under anaesthesia. GENERALISED NEUROFIBROMATOSIS MAY NOT require any surgical intervention unless complications tend to occur i.e. ulceration or suspicion of malignant change.

Neurofibromas affecting the major nerve may require careful DECOMPRESSION because they are difficult to remove without removal of the nerve itself.

5. KELOID

- It is found in scars of surgery, burns and pricks. Probably it develops due to defects in the maturation and stabilisation of collagen fibres. Keloid continues to grow into the SURROUNDING SKIN in a tumour like fashion (c/f hypertrophic scar) and is more common in young adults.
- A spontaneous type is found on the chest (sternum). Its shape is like a butter fly. A HYPERTROPHIC SCAR always remains confined to the site of injury and never invades normal skin.
- It reaches its maximum prominence at about 3 to 6 MONTHS. After this time, it gradually regresses. The BEST SCARS are obtained in OLD PEOPLE.
- However, it is difficult to differentiate between keloid and hypertrophic scar before the time period of 6 months.

D/D :

Hypertrophic scar.

Clinically :

There is histroy of injury or surgery. It causes ITCHING. The Scar (Keloid) is RAISED, LOBULATED, FIRM, PINKISH with claw-like processes growing out from it, into the NORMAL SKIN. Tenderness is usually absent.

Treatment :

No treatment is satisfactory and the recurrence is common. For cosmetic reason, itching and progressive state, treatment becomes necessary.

1. LOCAL STEROID INJECTION—**Triamcinolone** is injected directly into the Keloid scar using an insulin syringe, until the scar becomes white.
2. Superficial X-RAY THERAPY.
3. Complete excision followed by "Z" plasty or split skin graft.
4. Intra Keloidal excision or shaving the scar to its base and application of a split skin graft.

6. HAEMANGIOMA

It is a HAMARTOMA of blood vessels, commonly found in skin and subcutaneous tissue. It can also occur in other parts of body e.g. liver, bowel, intra cranial, vertebrae etc.

1. CAPILLARY HAEMANGIOMA :

Salmon Patch : Occurs at birth but uaually disappears by one year of age.

Port Wine Stain : It is a purple or dark red flat patch, which PERSISTS throughout life. Treatment by excision and grafting or by CO_2 snow (cryosurgery) or Nd Yag Laser may be successful.

Strawberry Angioma : It develops between one and three weeks of age and presents as a strawberry-like swelling. It is compressible. Usually it resolves completely by the age of 7 or 8 years.

2. CAVERNOUS (VENOUS) HAEMANGIOMA :

They consist of dilated blood spaces with thin walls supported by a tenuous stroma. It is common on face, ear and lip. Cavernous haemangioma can also arise in other internal organs e.g. in liver.

Clinically : It is bluish swelling, RAISED above the skin surface with spongy feel and COMPRESSIBLE. Occasionally it is calcified with palpable nodules within it. It is also found in Sturge Weber syndrome.

3. PLEXIFORM OR ARTERIAL HAEMANGIOMA :

It is a diffuse, PULSATILE, compressible swelling with systolic thrill & bruit. It feels like a bag of earth worms. The pulsating swelling of arteries and arterialised vein is called a CIRSOID ANEURYSM.

Complications : Ulceration and haemorrhage.

D/D :

Any cutaneous swelling.

Treatment :

1. BOILING WATER INJECTION (Or, Hypertonic saline (20%) or any other sclerosing agent)—which is repeated at regular interval.

2. Application of YAG LASER in selected cases.
3. Excision and suture/grafting in selected cases where adequate fibrosis has occurred as a result of sclerotherapy.
4. Therapeutic embolisation of feeding artery (as revealed by arteriography).

7. NAEVUS (BENIGN MELANOMA)

1. Junctional Naevus : It is flat, or raised smooth and pigmented (JET BLACK) usually HAIRLESS. Common sites are PALM, SOLE and genitalia. Microscopically aggregations of melanocytes are found projecting into the dermis. It may change into a MALIGNANT melanoma.

2. Intradermal Naevus (Common Mole) : It is flat or raised, smooth, dark brown in colour, usually HAIRY. Common sites are limbs, face and trunk. MALIGNANT CHANGE DOES NOT occur.

3. Compound Naevus : It is a combination of junctional and intradermal naevi.

4. Juvenile Melanoma : It is a type of compound naevus seen in children, usually on the face.

Features of Malignant change in a Naevus :

1. INCREASE IN SIZE.
2. Hyperpigmentation (variation in colour).
3. SPREAD OF PIGMENT into the surrounding skin.
4. HALO of pigment in the surrounding skin.
5. ULCERATION, BLEEDING, CRUSTING erosion and itching.
6. Enlargement of regional lymph nodes.

Treatment :

The lesion could be excised or destroyed by CRYOSURGERY for cosmetic reasons, or where the lesion is subject to repeated trauma or suspicion of malignant change. EXCISION BIOPSY is the treatment of choice.

8. MALIGNANT MELANOMA

It is a MALIGNANT TUMOUR arising from MELANOCYTES or Melanoblasts after puberty.

Origin :

1. DE-NOVO (10 percent of cases.)
2. MALIGNANT CHANGE in pre-existing NAEVUS (JUNCTIONAL, compound, freckles)—90 percent of cases.

Types :

1. **Lentiço Maligna Melanoma :** (Melanoma arising in Hutchinson's melanotic freckle). It presents as a flat pigmented, brown to black lesion with irregular outline, which gradually enlarges over the years. It is common in old age. Junctional activity is profound with proliferation of atypical melanocytes. After 10 to 30 years, lentigo maligna changes into a malignant melanoma. However it is the least common and least malignant.

2. **Superficial Spreading Melanoma :** It is the most common but less aggressive lesion. The lesion is usually palpable and nodules may develop within the tumour.

3. **Nodular Melanoma :** This is the most malignant melanoma found in the younger age groups. It is always palpable and convex in shape. Surface is smooth with irregular outline. Ulceration, bleeding, and oozing may occur.

4. **Acral-Lentiginous Melanoma :** Such lesions occur on the palms and soles and under the nail (Subungal Melanoma). The prognosis is poor.

5. **Amelanotic Melanoma :** The lesion is pink with some pigmentation at the base. They may often present with regional lymph node metastases.

Classification :

(A) **Histological** (CLARK'S LEVEL OF INVASION) : Level 1 to Level 5—depending upon the invasion of epidermis upto Subcutaneous fat.

(B) **Tumour thickness** (BRESLOW'S CLASSIFICATION) : Staging is done by measuring maximal vertical thickness-Stage 1 to Stage 4.

Tumour thickness from 0.75 mm to 3 mm. Breslow's tumour thickness is more accurate as a prognostic index.

Clinically :

Changes in mole as detailed above will be present e.g. INCREASE IN SIZE, HALO of PIGMENT, ULCERATION, BLEEDING

etc. There may be INTERMEDIARY NODULES (in-transit depisits between the primary growth and regional lymph nodes). Regional lymph nodes may also be involved by the secondary deposits. Blood-borne metastases can occur in the LUNGS, LIVER, brain, skin and in the bones. SECONDARY DEPOSITS are typically BLACK.

Rarely melanoma arises in the eye, in the meninges or at the mucocutaneous junction zones e.g. mouth and anus.

D/D :

OTHER PIGMENTED LESIONS OF SKIN e.g.

- Pigmented basal cell carcinoma.
- Seborrhoeic keratosis.
- Dermatofibroma.
- Thrombosed haemangioma.
- Pyogenic granuloma.
- Subungal haematoma.
- Cafe-au-lait spots (associated with neurofibromatosis or sometimes with pheochromocytoma).

Treatment :

A. Surgery :

1. **Wide excision** of the lesion followed by biopsy (Excision biopsy). The deep fascia is not included in the excision. The residual defect may require split skin graft.
2. **Prophylactic block dissection** is usually not favourable. BLOCK DISSECTION should be done only in cases where the primary lesion lies in CLOSE PROXIMITY to the regional LYMPH NODE group.
3. **Subungal melanoma** is treated by disarticulation/AMPUTATION of the digit at its base.
4. Intermediary nodules should be excised & sent for biopsy.

B. Radiotherapy and **Chemotherapy** has no role in the managment of Primary lesion as it is radio resistant and chemoresistant.

C. Endolymphatic therapy with Radioactive 131_I or Regional perfusion of cystoxic drugs (e.g. Malphalan) may be tried in selected cases.

D. Immunotherapy by interleukin-2 with or without leukocyte activated killer cells, is still under experimental stage.

9. GRANULOMA PYOGENICUM

It is a chronic inflammatory swelling. **Common sites** are the fingers, the toes and face. It looks like haemangioma. **Consistency** is **soft** and **boggy** with a **pedunculated** base. **Treatment** is excision.

10. GANGLION

It is a Cystic swelling containing clear **gelatinous fluid**. It originates in the synovial membrane of tendon sheaths or of the joints due to **myxomatous degeneration**. They usually **communicate** with a tendon sheath or the capsule of a joint but the communication is tortuous and difficult to demonstrate.

Common sites :

1. Dorsum of the **wrist**.
2. Dorsum of the foot.
3. Palmar aspect of the wrist.

Clinically :

It is spherical, **firm**, cystic swelling with smooth surface. Skin is free. **Fluctuation test** is **positive** (by Paget's test). Swelling is mobile across the axis of the tendon.

Treatment :

1. **Traumatic rupture** of the cyst by a blow.
2. Needle aspiration with or without an **injection of triamcinolone** into the remaining sac.
3. In case of failure of the above mentioned treatment— **Excision** under general or regional anaesthesia is done. The communication in the tendon sheath (or the joint capsule) should be carefully excised.

Compound Palmar Ganglion :

Inflammatory degeneration of the common synovial sheath of the flexor tendons of the fingers.

Swelling extends both above and below the flexor retinaculum. It is usually due to tuberculosis.

11. BURSITIS

It is commonly due to repeated pressure or injury to the anatomical bursae e.g. **Olecranon bursa (student's elbow)** or **Prepatellar bursa (house-maid's knee)**.

Semimembranous bursae may enlarge when there is an effusion in the joint due to **Osteoarthritis**. Synovial cysts in the popliteal fossa may arise from the semi-membranous bursa and are known as **Morrant Baker cysts**.

Treatment :

Excision of the bursae under a general anaesthetic.

12. COLD ABSCESS

It is due to the **tuberculosis** of lymph nodes or of spine. It contains **cheesy material** due to caseation necrosis. Pus from the spine gravitates through the **fascial planes** or peri-neural sheath. There may be matted lymph nodes around the abscess or features of the tuberculosis of the spine.

Signs of **acute inflammation are absent**. It is **soft, cystic non-tender** and **non-transilluminant**.

A **Collar stud abscess** develops in the neck and is bilocular with a narrow communication **(perforation in the deep fascia of the neck)**. Hence, the two loculi are on two sides of the deep fascia.

Treatment :

1. Anti-tuberculous drugs.
2. **Repeated aspirations** with local instillation of **Streptomycin.**
3. In selected cases, incision and curettage of the abscess.

B. NECK

1. CLASSIFICATION

I. Any non-specific swelling from the **skin** and Subcutaneous tissue.

II. Mid line swellings :

Ludwig's angina, Enlarged submental lymph nodes, Sublingual

dermoid, Thyroglossal cyst, Ranula, Subhyoid bursitis, Extrinsic Ca of larynx, Swellings from the thyroid isthmus, Enlarged lymph nodes, Retrosternal goitre.

III. Swellings on the side :

(a) **Submandibular region :** Swellings of the lymph node, submandibular salivary gland, plunging ranula, actinomycosis.

(b) **Carotid triangle** : Branchial cyst, Carotid body tumour (chemodectoma), aneurysm of the carotid artery.

(c) **Posterior triangle** : Supraclavicular lymph node enlargement, lipoma, cystic hygroma, pharyngeal pouch, cervical rib, aberrant thyroid, Pancoast's tumour.

(d) **Thyroid swellings.**

(e) **Sternomastoid tumour.**

(f) **Swellings on the back of the neck** : Lipoma, Meningocele.

2. THYROGLOSSAL CYST

It arises from the remnant of the thyroglossal duct. It is a midline swelling. The commonest site is the **subhyoid region**. Other sites may be below the foramen caecum (rarest), floor of the mouth, suprahyoid, in front of thyroid cartilage or cricoid cartilage.

It moves upwards with deglutition but the characteristic feature is that it **moves up on protrusion of the tongue.**

Thyroglossal fistula : It is mostly acquired as it follows infection or incomplete removal of a thyroglossal cyst or incision & drainage.

D/D :

Subyoid bursitis.

Swellings moving with deglutition are—Thyroid swellings, thyroglossal cyst, subhyoid bursitis and pretracheal or prelaryngeal lymph nodes.

Treatment :

Sistrunk's operation : Excision of the thyroglossal track along with the excision of the **central part of hyoid bone** (because the track is closely related to the body of the hyoid).

3. SUBHYOID BURSA

It is an elongated midline swelling situated below the hyoid bone. It moves upwards with deglutition but not on protrusion of the tongue. It is cystic, fluctuant and nontransilluminant.

4. BRANCHIAL CYST

It develops from a **cervical sinus** which persists after fusion of the **second** and **sixth** branchial **arches**. It lies beneath the anterior border of the **upper third of the sternomastoid** and contains clear or turbid fluid and **cholesterol crystals**. It is lined by squamous epithelium. The track passes through the fork of **common carotid artery** as far as pharyngeal wall.

It passes superficial to the **hypoglossal** and **glossopharyngeal nerves**. Its wall is surrounded by lymphoid tissue, hence recurrent inflammation is common. It is tense, cystic and nontransilluminant.

D/D :

Cold abscess (absence of cholesterol crystals in the aspirate).

Branchial fistula : It develops due to persistent second branchial cleft and the orifice lies in the **lower third of the anterior border** of the sternomastoid muscle. It may be associated with **a branchial cartilage** and/or **cervical auricle**.

Treatment :

Excision of the track **(Ladder pattern incisions)** similar to that of branchial cyst.

5. CYSTIC HYGROMA

It is a congenital malformation arising from the **congenital lymph sacs**. It is found at the root of the neck in the posterior triangle, deep to the sternomastoid muscle. It is seen in **infants and young chidren**. It may occur in the cheek, axilla, groin or in the mediastinum. Sometimes, spontaneous regression may occur due to recurrent infection.

Clinically :

It has **lobulated surface** and ill-defined margins. It is **soft, cystic, partially compressible** and always **brilliantly translucent**.

D/D :

Other swellings of the neck (absence of transillumination test and compressibility).

Treatment :

1. Repeated **injection of sclerosing solutions** i.e. boiling water or hypertonic saline.
2. **Excision** of all the cysts.

6. STERNOMASTOID TUMOUR

It is a haematoma of the sternomastoid muscle, caused by birth trauma, noticed during the first few weeks of life. Untreated, it undergoes fibrosis and may cause torticollis.

C. JAW

1. EPULIS

It is a solid swelling arising from the **mucoperiosteum** of the gum. It is a **sessile** or **pedunculated** mass found at the neck of a canine or premolar tooth. It is **red** or **pinkish**, firm, nontender, slow growing and **bleeds**. It may protrude between irregular teeth.

Types :

1. **Fibrous or granulomatous :** It is bright red, soft with irregular ulcerated mucous membrane covering it. Extraction of tooth, excision of the mass with currettage is essential for the cure.

2. **Myeloid epulis (giant cell epulis)** : It is an osteocloastoma arising from the mucoperiosteum of the gum, clinically presents as soft, smooth, sessile (c/f Fibrous epulis) with lobulated surface and plum coloured. Ulceration, bleeding and rapid increase in size are characteristic. Extraction of teeth and wide excision must be done at the earliest.

3. **Carcinomatous epulis** (Epithelioma of gingiva) : It is an infiltrating lesion which ultimately invades the adjacent bone. Cervical lymph nodes are enlarged.

Surgery followed by radiotherapy is the **treatment** of choice.

2. DENTAL CYST
(Periapical, Radicular)

It is found in relation to a normally erupted but **pulpless carious tooth with apical infection**. It is a unilocular cyst commonly developing in relation to the incisors or canines of the maxilla. It is more common in middle age. It is lined by stratified squamous epithelium derived from the epithelial debris of Mallassez and contains cholesterol crystals.

It may extend into the maxillary sinus & cause bulging of the check.

Treatment :

The cyst should be treated by enucleation of the lining from the bony cavity and primary closure of the wound or marsupialisation.

3. DENTIGEROUS CYST

It is a uniocular cyst arising in connection with an **unerupted permanent** tooth, usually upper third molars. It is painless, slowly growing cyst. The cyst lining is usually attached around the neck of the tooth.

It is painless & slowly growing; **expanding the outer table of the jaw**. Eggshell crackling may be present.

Missing tooth and the **X-ray** showing the **tooth** inside the cavity clinches the diagnosis.

Treatment :

Excision/ Enucleation and packing of the bony cavity.

4. ADAMANTINOMA
(Ameloblastoma)

It is almost exclusively found in the **lower jaw**. It is a **locally malignant tumour**. The tumour histologically looks and pathological behaves like a basal cell carcinoma. Microscopically it shows a central core of star cells, surrounded by columnar cells.

It is painless slowly growing affecting the region of the lower moral teeth. It expands the outer tabe of the bone, producing egg-shell crackling.

X-ray shows an **expansion and thinning of the cortex** with a **soap-bubble appearance**. It shows well defined trabeculations (c/f osteoclastoma).

Treatment :

1. Simple curettage is followed by recurrence.
2. Partial resection of the mandible including the healthy bone on the either side.

D. ORAL CAVITY

1. RANULA

It is a **retention** (Extravasation) cyst on the floor of the mouth and the **undersurface of the tongue**. Probably it arises from a damaged sublingual gland. The wall is composed of a delicate capsule of fibrous tissue. Ranulas may rupture and discharge, but the recurrence is common.

Plunging Ranula : It has an extension to the neck in the submandibular region and is palpable bimanually.

It is a **soft, tanslucent bluish** swelling with prominent blood vessels running over its surface.

Treatment :

Marsupilisation is successful in majority of cases. Some cases may require the offending gland mass (sublingual gland) to be removed.

2. MUCOUS CYST

It is a slowly growing retention cyst of mucous glands, occurring on the inside of the lip or cheek. It is soft, cystic and translucent. It may be marsupilised or excised.

3. DERMOID

It may be median or lateral, supramyelohyoid or sublingual.

It is treated by careful enucleation or excision.

E. TONGUE

ULCERS : See next chapter.

MACROGLOSSIA

The causes are

1. Lymphangioma
2. Haemangioma
3. Neurofibroma
4. Primary amyloidosis
5. Myxoedema
6. Muscle hypertrophy.

F. PAROTID

1. ADENOLYMPHOMA (Warthin's tumour)

It is a type of monomorphic adenoma. It is an epithelial tumour arising within a **periparotid lymph node**. It is common in males above 40. It is slowly growing, **encapsulated** tumour.

Clinically : It is painless, oval swelling with a smooth surface and well-defined margins. It is soft, cystic and mobile.

D/D : Pleomorphic adenoma.

Treatment : Excision (Enucleation) of the tumour.

2. MIXED PAROTID TUMOUR (Pleomorphic adenoma)

It is the most common tumour of the parotid gland. It is **potentially malignant**. It appears in adult life and grows over a period of many years. It is called mixed tumour because it contains cartilagenous tissue beside epithelial tissue. Microscopically it shows **pleomorphic stroma** containing lymphoid, myxomatous, pseudo-cartilaginous and epithelial elements. It has the tendency to grow **through (invade)** the capsule. It is radio-resistant.

Clinically :

It is rounded, small to large in size and firm **elastic to rubbery hard** in consistency. It is nontender, nonfluctuant, nontranslucent, freely mobile with a smooth or lobulated surface and well defined margins.

Complications :

1. **Malignant changes** : Rapid increase in size, pain, hard consistency, fixity to the skin, and involvement of the fascial nerve.

2. **Recurrence** : May be due to incomplete excision or **implantation** of the tumour cells during manipulation.

Treatment :

Superficial Parotidectomy (Patey's operation).

3. CARCINOMA OF THE PAROTID GLAND

It usually arises in elderly persons. Malignancy may start de-novo or the malignant change may occur in a mixed parotid tumour. Diagnostic criteria—as discussed under mixed parotid tumour (Malignant changes).

It is radioresistant.

Types of parotid carcinoma are

1. Acinic cell tumour
2. Mucoepidermoid tumour
3. Adenoid cystic carcinoma
4. Adenocarcinoma
5. Squamous cell carcinoma.

Treatment :

1. Total conservative parotidectomy (i.e. with preservation of the fascial nerve).
2. Radical parotidectomy, where the fascial nerve is sacrificed.
3. Palliative deep X-ray therapy.

G. UMBILICUS

1. UMBILICAL GRANULOMA

It is a chronic infection of umbilical cicatrix following severance and tying off of the umbilical cord.

The umbilicus is surrounded by a bright red, moist mass of glanulation tissue, which is friable and bleeds on touch.

D/D : Umbilical adenoma.

In adults, sometimes there is diffuse inflammation of the umbilical area often with pus or blood discharge. **Umbilical calculus** may form in a deep recess of the umbilicus as a result of collection of inspissated desquamated epithelium. Pouting **granulation** tissue is always present.

Causes of blood discharge from Umbilicus :

1. Umbilical adenoma
2. Umbilical granuloma
3. Endometrioma of the umbilicus
4. Umbilical calculus.

Treatment :

1. Application of silver nitrate stick, followed by dry dressing and antibiotics.
2. Umbilical calculus—may need umbilectomy.

2. RASPBERRY TUMOUR
(Umbilical adenoma, Enteroteratoma)

It arises due to patent **distal portion** of the **vitellointestinal duct**. It is a **pedunculated** or **sessile, pinkish, soft, fleshy mass** at the **umbilicus**. It is moist with mucous and tends to **bleed**. Intestinal obstruction may occur if there is an associated intraperitoneal band.

Vitello-intestinal duct—if persists—may lead to

(a) **Meckel's** diverticulum at the proximal portion.

(b) **Enterocystoma** : at the intermediate portion.

(c) **Enteroteratoma** : at the umbilicus.

(d) **Fibrous band** from ileum to the umbilical region).

Treatment :

1. A ligature is tied around its base, the polyp drops off in a few days.
2. Umbilictomy, if there is recurrence.

3. DESMOID TUMOUR

It arises from the rectus sheath or from other musculo-aponeurotic structures in the abdomen. It is common in women.It is hard, smooth and free from the skin. Recurrence is common after excision.

●

II. ULCER

1. RODENT ULCER
(Basal cell carcinoma)

It is a slow growing malignant tumour of skin. It arises from the basal layer i.e. rete malpighi of the skin, hair follicle, sweat glands and sebaceous glands. This tumour is common in white skinned subjects residing in tropical countries. **Predisposing factors** are (a) Exposure to Sunlight (b) Irradiation (c) Arsenical dermatitis. 90 percent are found on the face **above** a line joining the **angle of mouth to the external auditory meatus**. The commonest site is near the inner or outer canthus of the eye (hence called **tear cancer**).

It is called Rodent ulcer because it has a tendancy to erode deeper structures such as muscles, cartilage and bone (Rodent Rat).

Pathology : Macroscopic types are

1. **Ulcerative** (Commonest)
2. **Nodular**
3. **Cystic**
4. **Pigmented nodule**
5. **Field-fire** (spreading edge and central scarring).

Microscopic features :

It consists of masses of darkly staining cells with a characteristic arrangement—an outer palisade layer of columnar cells surrounding a central mass of polyhedral cells. There are no cell nests or keratinisation. Rarely the tumour may change into an epithelioma (Basosquamous carcinoma).

Spread :

The tumour is locally malignant. Dissemination by lymphatics or blood does not occur.

Clinical features :

It usually presents as a slowly growing painless ulcer or nodule on the face.

The ulcer is non-tender with **raised rolled** (not everted) margin which is often **beaded**. The floor is covered with a coat of dried serum. The base consists of either fat or muscle or bone. Lymph nodes are not enlarged.

D/D :

Squamous cell carcinoma, Keratoacanthoma and Amelanotic melanoma.

Treatment :

1. **Radiotherapy** : It may cure over 90 percent of the lesions. But radiation therapy should not be used when tumours invade bone or cartilage, because of the feat of subsequent **necrosis**.

2. **Excision** of the **growth** where radiotherapy is contraindicated e.g. lesions close to the eye.

3. **Electrodescication, curettage, cryosurgery** and **topical** fluorouracil may also be used in selected cases.

2. SQUAMOUS CELL CARCINOMA
(Epithelioma, Epidermoid, Carcinoma)

It is a malignant tumour arising from squamous **(prickle cell layer** in the case of skin).

Predisposing factors :

1. Senile (solar) keratosis.
2. **Bowen's disease** : It is an intraepidermal carcinoma, (carcinoma-in-situ). Changes are cytological but not histological i.e. basement membrane remains intact. It presents as a single irregular reddish brown enlarging plaque.
3. Lupus vulgaris (Tuberculosis of skin).
4. Radiation dermatitis.
5. Pitch, tar, soot, smoking.
6. Chronic ulcer e.g. Marjolin's ulcer.

Common sites :

Lips, hands, penis, vulva, anus etc.

The tumour starts as a small nodule which subsequently breaks to form a typical malignant ulcer.

Microscopically, solid clumps of epithelial cells are seen growing irregularly into the dermis. Keratinization, **cell nests** or **epithelial pearls** are commonly present.

Squamous cell carcinoma may also arise in other organs e.g. buccal cavity, tongue, pharynx, oesophagus etc. Occasionally it may arise in other internal organs due to **metaplastic changes** of the columnar epithelium e.g. in gall bladder, bronchus, pelvis of kidney etc.

Spread :

It is mainly through **lymphatics** and **regional nodes** may be involved.

Blood borne metastases occurs in very advanced stages.

Clinical :

Presentation of skin epithelioma may be

1. **Ulcerative type** (common) 2. **Proliferative type**

It starts as a nodule, crack or fissure which grows to form a **sessile, cauliflower**-like mass, with **hard** consistency.

Edge is raised and everted.

Floor is nodular and shows presence of greyish white slough.

Base is **indurated** & may be fixed to the deeper structures.

Regional **lymph nodes** are enlarged, **hard** and fixed in late stages.

Biopsy of the tissues taken from the **margin** of the ulcer will confirm the diagnosis.

D/D :

Rodent ulcer, Keratoacanthoma and Amelanotic melanoma.

Treatment :

1. **Wide Excision** with primary closure or with skin grafting.
2. Radiotherapy : **Interstitial irradiation** is particularly useful in ca lip or tongue.
3. **Block dissection** of regional **lymph nodes** or Radiotherapy is indicated only if there is clinical evidence of nodal disease.
4. Electrodescication can be used to treat lesions less than 1 cm in diameter.
5. **Mohs' surgery** : It involves the precise mapping and **frozen-section control** of the entire resection area.

3. CARCINOMA OF THE TONGUE

The type of the growth is mainly **squamous-carcinoma**. Rarely a Salivary adenocarcinoma or a Lymphoepithelioma may develop.

Predisposing factors :

1. **Leukoplakia** (due to smoking, syphilis, sepsis, sharp jagged teeth, spirits and spices).

2. **Papilloma.**

The commonest site is the **lateral margin** of the anterior two-thirds.

Clinically :

It presents as (1) **Indurated ulcer** with **hard feel** & **everted margin** or (2) Proliferative mass.

Spread may be direct by continuity or by contiguity. Lymphatic metastases goes to cervical nodes, which is homolateral from the anterior two thirds and bilateral from the posterior third and the tip. Blood-borne metastases is rare.

Common symptoms are

(a) **Pain**, local or referred to the **ear** (by way of the auriculo temporal nerve)

(b) Profuse **salivation**

(c) **Ankyloglossia**

(d) Dysphagia

(e) Difficulty in speech.

Causes of death :

1. **Inhalation bronchopneumonia**.
2. **Haemorrhage** due to erosion of a big vessel by malignant tissues.
3. Inanition and cachexia.

D/D : Ulcers of the tongue.

Types of the ULCERS OF TONGUE are : (a) Traumatic or dental (b) Aphthos (c) Tuberculous (d) Syphilitic (e) Post-pertussis (f) Chronic non-specific.

Treatment :

1. Radiotherapy (interstitial irradiation).
2. Wedge resection or Partial glossectomy.

4. CARCINOMA OF THE LIP

The **Lower lip** is involved in over **90 percent** of cases. The type is squamous cell carcinoma.

The **Predisposing factors** may be (a) Recurrent chelitis (b) Addiction to **tobacco** (khainy).

Clinically it may present as a nodule or a malignant **ulcer** or a warty **papilliferous** growth.

Spread is mainly to the **submental**, submandibular and jugulodigastric lymph nodes.

D/D :

Herpes, Lymphangioma, Haemangioma and Mucous cyst.

Treatment :

1. Radiotherapy is the treatment of choice.
2. Wedge resection of the growth in selected cases.
3. Lymph nodes, if involved may be treated by block dissection or radiotherapy.

5. CARCINOMA OF THE PENIS

Carcinoma of the penis occurs in males who have not been circumcised in childhood.

(a) Chronic balanoposthitis

(b) Leukoplakia of the penis

(c) Genital wart (HPV infection)

(d) Paget's disease of the penis (erythroplasia of Queyrat, Bowen's disease of the glans). Carcinoma of penis may be

(a) **Infiltrating** (b) **Papillifrous.**

Microscopically it is squamous cell carcinoma. **Spread** is to the **inguinal** and then to the **iliac lymph nodes.** The fascial sheath of the corpora cavernosa resists direct spread to the body of the penis, so that the growth is limited to the gland for many months.

Clinical features :

Commonly the patient is above 40 years of age but younger persons may be affected.

Early symptoms are a mild irritation inside the prepuce and a **purulent** discharge and **narrowing** of the **prepucial orifice.**

A dorsal slit may be performed to detect the growth.

Untreated, the whole gland becomes a **fungating** and **foul smelling** mass. Inguinal nodes are enlarged & hard. Nodes may even fungate through the skin.

Usually the patient dies due to **torrential haemorrhage** following **erosion** of the femoral or **external iliac artery.**

Treatment :

1. **Partial amputation of penis** : For growths limited to the glans penis.

2. **Total amputation of penis** : When the growth involves the body of the penis.
3. **Radiotherapy** : For small well differentiated tumours.

6. MARJOLIN'S ULCER

It is a low grade **squamous cell carcinoma** arising from the epithelium covering the **scar tissue**, keloid, long standing **venous ulcer** or chronically discharging **osteomyelitic sinus**.

As the scar tissues contain **no nerves**, no **lymphtics**, the lesion is painless and there are **no lymphatic metastases**.

Due to avascularity it is **radioresistant**.

Treatment :

Wide excision followed by skin grafting.

7. RARE MALIGNANT TUMOURS OF SKIN

Besides **common malignant tumours** of skin, like

(a) Rodent ulcer (63%).
(b) Squamous cell carcinoma (30%).
(c) Malignant Melanoma (3%).
(d) Marjolin's ulcer.

Other **rare tumours** are

1. Markal cell carcinoma (trabecular carcinoma)
2. Paget's disease
3. Angiosarcoma
4. Sebaceous carcinoma
5. Kaposi's sarcoma
6. Cutaneous metastases
7. Cutaneous malignant lymphoma
8. Epitheloid sarcoma
9. Dermatofibrosarcoma protuberans.

8. TUBERCULOUS ULCER

– Commonly develops due to rupture of **cold abscesses** or from tubercular **bone** or joint lesions or over the scrotum (epididymis—situated posteriorly).

- May be multiple.
- Characterised by thin **bluish, undermined margin** with **apple-jelly granulation** and **serous** discharge.
- Base may be indurated and attached to the pathological lesion e.g. lymph nodes.
- **D/D :** Non-specific ulcer, malignant ulcer.

9. SYPHILITIC ULCER
(Gummatous ulcer)

- Present over the subcutaneous bones e.g. tibia, sternum or over the scrotum (in relation to **testis**)—situated anteriorly.
- Usually solitary with **punched out margin** and **wash-leather slough**.
- Signs of other syphilitic stigmata may be present.
  W.R., Kahn and V.D.R.L. tests—positive.
- **D/D :** Non-specific ulcers, tuberculous ulcer.

10. TROPHIC ULCER
(Penetrating ulcer, Perforating ulcer)

- Site : **Sole, heel** of the foot (pressure areas).
- Common causes : diabetic neuritis, leprosy, alcoholic neuritis and other neurological diseases.
- **Painless** and non tender.
- Surrounding tissue healthy with **normal circulation**.
- **Loss of sensation**, weakness of the muscles.
- Peripheral pulses usually present.
- Ulcer is **deeply penetrating** burrowing through the fascial plane, filled with **slough** (offensive material).
- May involve bones & joint.
- Blood and urine for Sugar—to see diabetes mellitus.

11. DIABETIC FOOT

In **diabetes**, gangrene may develop due to

(a) peripheral **neuritis**

(b) presence of **sugar** in the tissues and

(c) associated **atherosclerosis**.

D/D : Ulcers of the leg.

Treatment : Treatment of the cause, dressing, desloughing and reconstructive surgery.

12. VARICOSE ULCER
(Venous ulcer, Gravitational ulcer)

- Chronic painless ulcer.
- **Site** : Medial aspect of lower 1/3 of leg over the **medial malleolus**. Venous stasis leading to local anoxia, oedema and lypolysis are the underlying causes.
- Single and **oval** in shape with **irregular** margins, may be painful and tender, with **bluish pigmentation** of skin around the ulcer.
- Always associated with **varicose veins**.
- History suggestive of **deep vein thrombosis** mat be present with evidence of incompetent perforators.
- Investigations—**Deep Venogram** to know the patency of deep veins and the presence of valves.
- Carcinomatous changes may occur (**Marjolin's ulcer**).

D/D :

Ulcers of the leg.

Treatment :

1. Bed rest, curettage and skin grafting.
2. **Bisgaard method—elevation, bandaging**, massage and excercises.
3. Subfascial ligation of perforations in selected cases (**Cockett** and **Dodd** operation).

13. ARTERIAL ULCER
(Ischaemic ulcer)

- **Site** : Toes, dorsum of foot and heel.
- Ulcer variable in size and shape, punched out edge, skin at the edge may be greyish-blue, base may contain grey-yellow slough, occasionally bare bone or tendons.
- History of intermittent claudication, rest pain, diabetes, hypertension.

- Peripheral arterial pulses—poor or absent.
- Ulcer painful & tender.
- Ischaemic changes—dry cold skin, loss of hair, brittle nail, change of colour.
- Advanced cases—frank gangrene (loss of colour, loss of temperature, loss of sensation, loss of pulsation and loss of function).

Investigations :

(a) Doppler ultrasound blood flow detection.

(b) Duplex imaging.

(c) Phonongiography.

(d) Arteriography.

D/D :

Ulcers of leg & causes of peripheral vascular diseases e.g. Buerger's disease, atherosclerosis, thrombosis, embolism, diabetes etc.

Treatment :

(a) Treatment of sepsis, stoppage of smoking.

(b) Treatment of the cause including Lumbar sympathectomy, Endarterectomy, Venous bypass etc.

(c) Conservative amputation in cases of gangrene.

14. MALIGNANT ULCER
(Refer to Squamous cell carcinoma)

Malignant ulcers are **hard, nontender** indurated with **raised & everted margin** and fixed to deeper structure.

15. BAIRNDALE ULCER

- **Site :** Anywhere.
- Caused by Mycobacterium ulcerans.
- Irregular, thin undermined bluish margin with pale, watery granulation on the floor.
- Absence of varicosity.

16. TRAUMATIC ULCER

- **Site : Skin of the leg, malleoli,** back of heel, back of sacrum

and other **pressure points**. (**Bed sores** and plaster sores are included in this group).

Ulcer : Moderately deep, painful, tender, circular and the floor covered by unhealthy granulation tissue.

17. BED SORES
(Decubitus ulcers)

Predisposed by pressure, injury, anaemia, malnutrition and moisture.

Spreads with alarming rapidity in cases of spinal cord injury.

- **Common sites** : Pressure points, sacral area and trochanteric region.
- **Preventive measures** :
  - (a) 2-hourly change of posture.
  - (b) Maintaining the parts dry & clean.
  - (c) P.V.C. blocks, or a 'sheepskin'.
  - (d) water bed or a ripple bed.
- **Established cases are treated by**
  - (a) Correction of malnutrition and anaemia.
  - (b) Antibiotics.
  - (c) Dressing of the wounds.
  - (d) Keeping the surrounding skin dry and clean (use of rectified spirit and powder).
  - (e) Selected cases—may require debridement and the use of rotation flaps or flap pedicle grafting.

18. ULCERS OF THE LEG

	Types	Site	Duration
1.	Traumatic	Skin, malleoli, back of heel.	Short
2.	Venous	Medial malleolus (lower 1/3 of leg).	Long
3.	Arterial (ischaemic)	Peripheral, toes, dorsum of foot.	Short
4.	Trophic (neuropathic)	Pressure area, sole, heel of the foot.	Long

	Types	Site	Duration
5.	Tuberculous (rare)	Secondary to tuberculous osteomylitis of Os Calcis.	Long
6.	Gummatous ulcer	Outer side of leg.	Long
7.	Bairsdale ulcer	Anywhere.	Long

Causes of Delayed Healing of Ulcer :

1. Old age.
2. Anaemia, hypoproteinaemia.
3. Diabetes mellitus.
4. Persistent infection.
5. Excessive movement to the ulcer bearing part of the body.
6. Trophic ulcers due to sensory loss.
7. Ulcers over the bony prominences.
8. Callous ulcer (hard or indurated, no epithelisation).
9. Malignant ulcers.

●

III. SINUS OR FISTULA

1. GENERAL CONSIDERATIONS

Sinus :

A sinus is a blind tract lined by ganulation tissue or epithelium leading from an epithelial surface into deeper tissues.

Classification of sinuses :

1. **Congenital :** Preauricular.
2. **Traumatic :** It occurs due to implantation of foreign body or organisms in the deeper tissues.

3. **Inflammatory :**
   (a) Chronic osteomyelitic sinus
   (b) Tuberculosis
   (c) Actinomycosis
   (d) Inadequately drained abscess—e.g. **gluteal sinus** following drainage of gluteal (injection) abscess.
4. **Neoplastic :** A malignant growth with degeneration and infection.
5. **Miscellaneous :** Pilonidal sinus.

Fistula :

Fistula is an abnormal tract between two epithelial surfaces, lined by granulation tissue or epithelium.

Types :

(a) **External fistula :** Between skin and an internal viscus.

(b) **Internal fistula :** Between two internal hollow viscera.

Classification of fistulas :

1. **Congenital :** Branchial fistula, tracheo-oesophageal fistula, recto-vaginal fistula, recto-vesical fistula, recto-urethral fistula.

2. **Traumatic :** Trauma to hollow viscera; e.g. urinary, biliary, faecal, pancreatic, salivary, lymphatic.

3. **Inflammatory :** When nonspecific or specific abscess of any organ bursts externally to the surface or into a hollow organ, a fistula forms e.g. perinephric abscess.

4. **Malignant :** Faecal fistula with advanced carcinoma of caecum, urinary fistula with advanced carcinoma of the bladder.

5. **Miscellaneous :** Impacted stag horn calculus may result into urinary fistula.

Causes of persistence of a Sinus or Fistula :

1. **Repeated trauma : absence of rest** to the part.
2. Chronic irritation by irritating **discharge**.
3. Chronic untreated **specific infection : tuberculosis, syphilis** and **actinomycosis**.
4. **Epithelisation** of the tract.
5. In relation to **malignant growth**.

6. **Inadequate drainage :** small opening, **nondependent** drainage.
7. Presence of **foreign body** or **necrotic tissue.**
8. **Unrelieved obstruction** of the lumen of a Viscus or a tube distal to the fistula e.g. impacted urinary stone, growth or stricture of the bowel.

Investigations :

1. Sinogram or Fistulogram.
2. **Examination of the discharge :**

Actinomycosis	:	Sulfur granules.
Salivary	:	Ptylin.
Gastroduodenal	:	Hydrochloric acid.
Pancreatic	:	Bicarbonate rich fluid (enzymes).
Bowel	:	Faecal.
Urinary	:	Urea.
Biliary	:	Bile.

3. **Biopsy :** Tissue from the edge or the entire tract may be excised for histopathology.
4. Ultrasonography, C.T. scan, and M.R.I. can be useful in locating an undrained collection.
5. **Barium series** (meal or enema) : to exclude the presence of intestinal obstruction distal to the fistula.
6. X-ray chest, X-ray abdomen, and I.V.P. in selected cases.

2. TUBERCULOUS SINUS

— see Tuberculous ulcer

3. GLUTEAL SINUS OR NON-SPECIFIC SINUS

— Usually follow inadequate drainage of the abscess with a small opening in a non-dependent position.

— May contain necrotic material.

Treatment :

1. **Antibiotics :** depending upon the culture and sensitivity.

2. Curettage, laying open or excision of the tract & healing by granulation tissue.

4. ACTINOMYCOSIS

- A chronic granulomatous lesion, caused by Actinomyces Israelii, an anaerobic gram positive organism.
- **Common sites** : Cervico-fascial (65%), Ileocaecal (25%) and Pulmonary (10%).
- It follows an endogenous infection e.g. following dental extraction.
- Lymphatic spread does not occur. Blood spread may occur.
- Clinically presents as a painless hard brawny indurated swelling with **multiple sinuses**.
- Microscopical examination of the discharge reveals **Sulfur granules** (branching mycelial filaments with terminal clubs.)
- **X-ray** may show sclerosis of the bone with cavities and sequestra.

Treatment :

1. **Antibiotics** : Penicillin, Ampicillin, Lincomycin or Tetracycline—atleast for one to three months.
2. **Iodides** : May help the resolution of fibrosis.
3. **Operation** :
   (a) Incision and drainage,
   (b) Curettage & packing.
   (c) Removal of sequestra, if present.

5. PILONIDAL SINUS

Sites :

(a) **Natal cleft** (in midline behind the anus).

(b) **Interdigital cleft** (in hairdressers).

Origin :

(a) **Congenital** : from the remnant of neurenteric canal.

(b) **Acquired** : an excess of thick, dark hair in the intergluteal furrow, associated with repeated trauma.

Histological picture reveals a lining of stratified squamous epithelium containing hairs and epithelial debris.

Clinical features :

- Common between the ages of 20 to 30 years.
- Chronic or recurrent abscess or sinus in the **sacrococcygeal area.**
- Repeated infection with **multiple** secondary **sinuses** lying in a lateral position.
- May also be a **tuft of hair** projecting from one of the openings.

Treatment :

(a) **Complete excision** of the sinus, including all the ramifications and **primary closure.** Recurrrence is common.

(b) **Complete excision** of the sinus and allow the wound to heal by **granulation.**

(c) Laying open the tracks, removing all debris and hair and marsupialization (suture the edges of the sinus to the skin).

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IV. LYMPHADENOPATHY

1. CAUSES

Common causes of lymph node enlargements are :

(a) Acute infection in the drainage area.

(b) **Tuberculosis**

(c) **Filariasis**

(d) **Secondary**

(e) **Hodgkin's** or Non-Hodgkin's Lymp

(f) Sarcoidosis.

Causes of generalised lymphadenopathy :

I. ***Disorders of lymph nodes & haemopoetic system***

1. Acute lymphatic leukaemia
2. Chronic lymphatic leukaemia
3. Chronic myeloid leukaemia (late)
4. Polycythaemia vera (late)
5. Hodgkin's and Non-hodgkin's lymphomas.

II. ***Infection***

1. Tuberculosis
2. Filariasis
3. Infectious mononucleosis
4. Dengue
5. Secondary syphilis
6. Toxoplasmosis
7. Leishmaniasis
8. Listeriosis
9. Scrub typhus
10. AIDS syndrome.

III. ***Miscellaneous***

1. Sarcoidosis
2. Systemic lupus erythematosus
3. Rheumatoid arthritis
4. Drug reactions.

Causes of localised lymphadenopathy :

1. All conditions causing generalised lymphadenopathy may have localised lymph nodes enlargement either in the early stage or permanently.
2. Acute or chronic infectons in the drainage area.
3. Tuberculosis.
4. Secondary malignant disease.
5. Mycosis fungoides.

Clinical examination :

Besides examining the affected nodes, the clinical examination includes :

(a) examination of the catchment area for possible primary source of infection or malignant disease.

(b) examination of other group of lymph nodes and

(c) palpation of liver and spleen.

Investigations :

1. **Haemogram.**
2. W.R., V.D.R.L., Kahn test.
3. **X-ray chest.**
4. Blood smear for microfilaria.
5. Fine needle aspiration cytology **(FNAC).**
6. Lymph node **biopsy.**
7. Bone marrow biopsy.
8. Lymphangiography.

2. LYMPHOEDEMA (Elephantiasis)

Lymphoedema results from the obsturction of lymphatic flow.

Causes are :

(a) Congenital hypoplasia, aplasia or varicose dilatation of the lymphatics, which may be familial **(Milroy's disease).**

(b) **Post inflammatory** : due to repeated attacks of streptococcal cellutilis.

(c) **Filariasis** : due to blockage of lymphatic channels by Wuchereria brancrofti.

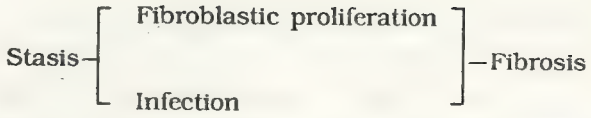
(d) Post-irradiation fibrosis.

(e) **Malignant disease** (secondaries) involving the lymph nodes.

(f) Following radical surgery e.g. **after block dissection** of inguinal nodes.

In the early stage, lymphoedema will pit on pressure. Subsequently subcutaneous tissues become indurated from fibrous tissue replacement and pitting will not then occur.

Obstruction :



Filariasis is the commonest cause of lymphoedema (elephantiasis). ***Elephantiasis*** of the lower limb can also occur in ***neurofibromatosis*** and ***leprosy.***

Treatment :

(a) Elastic stockings.

(b) Prolonged elevation of the limb.

(c) **Excision** of the whole oedematous subcutaneous tissues or **swiss-roll operation** may be considered in late cases.

3. CHRONIC PYOGENIC LYMPHADENITIS (Non-specific adenitis)

- Due to chronic infection in the drainage area.
- Lymph nodes : **firm & tender.**
- Blood picture : leucocytosis.

4. TUBERCULOUS LYMPHADENITIS

- Can occur at any age but common in children.
- Nodes involved : **Cervical**, mediastinal, mesenteric, axillary and inguinal.

Routes of infection :

(a) Most commonly, **tuberculous bacilli** reach the node via **lymphatics** (e.g. through the tonsil or pharynx) and are lodged in the **cortex** (sub capsular space), leading to tubercle formation, **periadenitis** and **matting** of the nodes.

(b) Rarely the bacilli reach the node by blood stream to the medulla, hence there will be no **periadenitis** and matting in the early stage.

Microscopic picture :

Typical giant cell system, comprising of Central area of caseation, surrounded by **epitheloid cells**, lymphocytes, plasma cells, and **Langerhan's giant cells.**

Clinical features :

- **General** : Evening rise of temperature, anorexia, anaemia, cough, loss of weight etc.
- **Local** : Nodes **enlarged, firm, non-tender** and **matted.**
- May be associated with **cold abscess**, tuberculous ulcer or sinus.

D/D :

Pyogenic adenitis, Secondary, Hodgkin's lymphoma.

Treatment :

Most cases resolve with **anti tuberculous drugs** :

	Drugs	Daily doses	Specific toxicity
1.	Rifampicin	450 to 600mg	Hepatotoxic
2.	Isoniazid	300 to 400mg	Peripheral neuritis
3.	Ethambutol	600 to 800mg	Optic neuritis
4.	Pyrizinamide	1500 mg	Toxic to joints
5.	Streptomycin	1 gm	Toxic to 8th nerve (Vertigo)

- **Excision** of the glands is indicated in selected cases.

5. FILARIAL LYMPHADENITIS

- Inguinal nodes usually involved.
- History of fever with rigor.
- Nodes : enlarged, firm and tender.
- May be associated with funiculitis, epididymo-orchitis, filarial scrotal tumour or any other surgical manifestation of filariasis.
- Blood picture—shows eosinophilia.
- Thick blood film—may show microfilaria.
- FNAC—adult filaria.

6. SYPHILITIC LYMPHADENITIS

- **Primary stage** : due to **Chancres.**
- Secondary stage : generalised lymphadenopathy common, particularly involving **epitrochlear** and **occipital** groups.
- Nodes are **firm, non-tender, discrete** and **shotty.**

7. SECONDARY (METASTATIC) LYMPH NODE

- Common in elderly persons.
- Painless, slowly growing lump.
- Nodes are enlarged, **non-tender, stony hard, mobile or fixed.**
- Search for the primary growth in the drainage area.
- **Troisier's sign** : Enlarged metastatic lymph nodes in the left supraclavicular fossa **(Virchow's gland)** may be present in association with abdominal malignancy e.g. carcinoma of the stomach.
- **FNAC** or **Biopsy** may be helpful in detecting the hidden primary growth.

8. HODGKIN'S LYMPHOMA
(Hodgkin's disease)

It is the commonest type of lymphomas and is common in the young between 25 and 40 years. It usually presents as a slowly growing painless lump in the neck.

(a) **Nodes** : pinkish grey in colour,

: no **periadenitis.**

(b) **Histological picture :** Pleomorphic appearance. Normal nodal architecture is replaced by lymphocytes, reticulum cells, eosinophils, fibrous tissue and **Dorothy-Reed-Sternberg giant cells** (containing two large mirror image nuclei).

(c) **Histological types :**

1. Lymphocyte predominant (best prognosis)
2. Nodular sclerosis (favourable prognosis)
3. Mixed cellularity (intermediate prognosis)
4. Lymphocyte depleted (poor prognosis).

(d) **Clinical staging :**

I. Single lymph node group involved.
Single extralymphatic organ involved.

II. Two/more groups on same side of diaphragm involved.

Localised involvement of extralymphatic organ on same-side of diaphragm.

Lymph nodes on both sides of diaphragm involved.

III. (a) No systemic symptoms.

(b) Systemic symptoms e.g. fever, loss of weight etc.

IV. Disseminated disease.

(e) **Clinical features :**

(a) Systemic symptoms : fever, sweating, weight loss, anaemia, bone pain, itching etc.

(b) Local findings : Nodes are **ovoid, smooth** and **discrete, firm** and **rubbery** in consistency. Surrounding skin usually normal.

(c) Enlargement of **spleen** and **liver.**

Pleural effusion, mediastinal compression syndrome, oedema of the legs and skin involvement (mycosis fungoides) in late stages.

(f) **Investigations :**

1. Blood picture.
2. **FNAC**/Node Biopsy.
3. X-ray chest e.g. Hilar nodes.
4. Ultrasonography.
5. C.T. scan.
6. Lymphangiogram.
7. Staging laparotomy.

Staging laparotomy includes

(a) Splenectomy

(b) Liver biopsy

(c) Node biopsy

(d) Tumour marking with metal clips to outline radiation portal.

Reasons for Splenectomy :

1. To know the microscopic involvement.
2. To prevent hypersplenism.

Treatment :

1. Radiotherapy : Stage I, II and IIIa
2. Chemotherapy : Stage IIIb and IV.

9. LYMPHOSARCOMA AND RETICULUM CELL SARCOMA

- Rapidly growing swelling in the neck.
- Surface is irregular and consistency is variable.
- Overlying skin is tense and shiny with engorged veins.
- FNAC or Biopsy of the node-confirms the diagnosis.
- Highly radiosensitive but poor prognosis.

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V. SCROTAL SWELLING

1. DEFINITION & CAUSES

TO GET ABOVE THE SWELLING—If the top of the swelling can be reached below the inguinal region, it is confirmed to be a scrotal swelling. c/f Inguinal Hernia.

1. **CYSTIC :**
   (a) **Hydrocele :** Fluctuation—positive
   Transillumination—positive
   Testis not palpable.
   (b) **Epididymal cyst :** Testis palpable.
2. **SOLID :**
   (a) Testicular Tumours—Seminoma
   —Teratoma.
   (b) Gumma (testis).
   (c) Tuberculosis (Epididymitis).

3. **INFLAMMATORY :**
   (a) Epididymo orchitis
   (b) Torsion testis.
4. **MISCELLANEOUS :**
   (a) Varicocele (bag of worms)
   (b) Haematocele
   (c) Chylocele.
5. Swellings from the skin e.g. sebaceous cyst.

2. HYDROCELE

A hydrocele is an abnormal collection of fluid within the tunica vaginalis (or some part of the processus vaginalis) of the testis.

Types :

1. **Primary or Idiopathic** : The cause is not known. Probably, it is due to filariasis, causing lymphatic obstruction.
2. **Secondary** : It is due to some pathological condition of the testis or epididymis e.g.
   Chronic infection
   Tuberculosis
   Gumma
   Tumour.

Anatomical Types :

1. **Vaginal hydrocele** : Commonest.
2. **Infantile hydrocele** : Extending upto the internal ring.
3. **Congenital hydrocele** : Communicating with the abdominal cavity through a narrow opening, admitting only the escape of fluid (e.g. tuberculous ascites).
   Cough impulse : may be present.
   Reducible : on lying down for prolonged period.
4. **Encysted hydrocele** : rare.
   Testis – palpable.
   Traction test – positive, the swelling comes down and becomes fixed on gentle traction of the cord.
5. **Hydrocele of the canal of Nuck** (in females).

Vaginal hydrocele : Hydrocele usually develops slowly and becomes large and tense.

Hydrocele fluid : Straw coloured, contains water, inorganic salts, fibrinogen and traces of a albumin, & clots when comes in contact with blood.

Clinical features :

- Common in the middle-aged men.
- May be unilateral or bilateral.
- Usually no pain, but may cause social embarrassment due to big scrotal swelling.
- To GET ABOVE THE SWELLING TEST—POSITIVE. c/f inguino-scrotal swellings, hernia. FLUCTUATION TEST—POSITIVE.
- TRANSILLUMINATION TEST—POSITIVE
  (Transillumination test may be negative if the skin or tunica is thick or the fluid is turbid e.g. in haematocele, chylocele, pyocele).
- TESTIS NOT PALPABLE. c/f epididymal cyst.
- A large hydrocele can obscure an associated inguinal hernia.

Complications :

1. Haematocele
2. Pyocele (infection)
3. Chylocele
4. Hernia of the hydrocele sac through the dartos
5. Testicular atrophy
6. Calcification
7. Rupture.

D/D :

Inguinal hernia, Epididymal cyst, Tumour of the testis.

Treatment : Operation

(a) Jaboulay's operation (evertion of the sac)

(b) Excision of the sac in selected cases

(c) Lord's procedure-plication of the sac with several interrupted sutures at the periphery of the testis.

3. EPIDIDYMAL CYST

1. **Cysts of epididymis**
   - Derived from the vestigial structues e.g. paradidymis, appendix of epididymis etc.
   - Contains crystal clear fluid.
   - Fluctuation test—positive.
   - Transillumination test—positive. Looks like chinese lantern (multilocular).
   - Testis palpable.
2. **Spermatocele**
   - Derived from sperm conducting system.
   - Nature of fluid—BARLEY WATER LIKE.
   - Fluctuation & transillumination tests—positive.
   - Testis palpable.

Treatment :

(a) Small cysts require no treatment.

(b) Excision of the cyst if the swelling is large.
DISADVANTAGE—INFERTILITY.

4. TUBERCULOUS EPIDIDYMITIS

- Secondary to tuberculosis of seminal vesicles.
- Retrograde infection along the vas deferens.
- GLOBUS MINOR affected first.
- Epididymis—NODULAR, FIRM and CRAGGY.
- Vas thickened & BEADED.
- Cold abscess, tuberculous ulcer/sinus situated POSTERIORLY and adherent to the overlying skin.

5. SYPHILITIC ORCHITIS (gumma)

- Manifestation of tertiary stage of syphilis.
- Painless enlargement of testis.
- Firm consistency.

- LOSS OF TESTICULAR SENSATION.
- Typical GUMMATOUS ULCER ANTERIORLY in late stages.
- Presence of other syphilitic stigmata and positive serological tests.

6. VARICOCELE

- It occurs due to dilatation and tortuosity of the cremasteric system of veins and the veins of the pampiniform plexus. It is common on the left side due to direct (perpendicular) entry of the left testicular vein into the left renal vein. It may be (a) Primary (idiopathic) (b) Secondary—due to obstruction of the testicular vein by some intra abdominal pathology e.g. Hypernephroma.
- May be asymptomatic.
- May be a complaint of dragging pain.
- One of the causes of male infertility or subfertility (because the testis is subjected to higher temperature following the stagnation of blood).
- The swelling becomes more prominent on standing and disappears on lying down.
- Typical feeling of BAG OF WORMS.

Treatment :

(a) CONSERVATIVE : Reassurance and suspensory bandage.

(b) OPERATIVE : Ligation of the dilated veins through inguinal or scrotal approach.

7. EPIDIDYMO-ORCHITIS

Acute :

(a) Filarial.

(b) Secondary to urinary infection.
(infection reaches along the vas deferens).

Chronic :

(a) Filarial.

(b) Non-specific (associated with recurrent urinary infection).

(c) Tuberculous.

Clinically (Filarial and non-specific) :

- Constitutional symptoms e.g. fever, malaise anorexia etc.
- Pain in the region of the testis.
- Scrotum usually red and swollen.
- Tenderness well marked.
- Testis and epididymis cannot be distinguished separately.
- Pain relieved on elevation of the scrotum. c/f TORSION TESTIS.

Treatment :

- Bed rest.
- Scrotal support.
- Symptomatic treatment e.g. antibiotics and analgesics.

8. TESTICULAR TUMOURS

Almost all testicular tumours are MALIGNANT. Maldescent predisposes to malignancy.

Types :

1. SEMINOMA (40%)
2. TERATOMA (32%)
3. Combined seminoma and teratoma (14%)
4. Interstitial tumours (1.5%)
5. Lymphoma (7%)
6. Other tumours (5.5%).

SEMINOMA AND TERATOMA **(Comparison)**

	SEMINOMA	**TERATOMA**
Origin	From mediastium of the testis	In the rete testis
Cells	Seminiferous tubules (spermatocytes)	Totipotent cells
Surface	Smooth	Irregular
Age	30 to 40 years	20 to 30 years
History	Long	Short

	SEMINOMA	TERATOMA
Spread	Lymphatic to PARA-AORTIC Left supra clavicular (Virchow's node)	Mainly HAEMATOGENOUS
Cut surface	Uniformly pink or cream in colour	Variable
Consistency	FIRM	VARIABLE
Prognosis	Better	Poor
Therapy	Radio-sensitive & chemo-sensitive	Relatively radio-resistant & chemo-resistant

TERATOMA **has been classified as follows :**

1. Teratoma differentiated.
2. Malignant teratoma intermediate.
   (Teratocarcinoma)
3. Malignant teratoma anaplastic.
   (Embryonal carcinoma)
4. Malignant teratoma trophoblastic.

Interstitial Cell Tumour :

(a) A sertoli cells tumour feminises.

(b) A Leydig cell tumour masculinises.

Clinical features :

- PAINLESS ENLARGEMENT of the testicle.
- Feeling of HEAVINESS in the scrotum.
- Coincidental history of trauma may be present.
- Testis—uniformly enlarged, smooth or nodular.
- Consistency—FIRM or VARIABLE.
- Complete LOSS OF TESTICULAR SENSATION.
- Secondary hydrocele may be present.
- PARA-AORTIC NODES (above the umbilicus) on the same side, the opposite side or both sides may be palpable.
- VIRCHOW'S NODE may be palpable.
- May be hepatic enlargement or findings in the chest.
- GYNAECOMASTIA may be present.

Investigations :

1. ULTRASONOGRAPHY of the testicle and the abdomen.
2. X-ray chest.
3. I.V.P.
4. C.T. Scan of whole body.
5. Serum marker levels of alpha fetoprotein (AFP) and β-human chorionic gonadotrophin (hCG).
6. EXPLORATION and TRANS-SCROTAL BIOPSIES by frozen section, through an inguinal approach with application of non-crushing clamps.

Treatment :

1. **Radical Orchidectomy** : Through an inguinal incision the spermatic cord is divided and ligated at the level of the internal ring. The cord and the testis are removed from above downwards.
2. **Radiotheraphy** and/or
3. **Chemotherapy** (Drug commonly used is CIS-PLATIN).

9. FOURNIER'S GANGRENE
(Idiopathic gangrene of the scrotum)

- Sudden pain in the scrotum due to inflammatory changes followed by gangrenous changes.
- Cause not known in most of the cases.
- Subsequently the entire scrotal covering sloughs.
- Streptococci, staphylococci, E. coli and/or Cl. weichii may be the causative factor, resulting in obliterative arteritis.

Treatment :

- Antibiotics & Metronidazole.
- Wide excision of the dead tissues & closure with drainage.

10. CARCINOMA OF SCROTUM

- See squamous cell carcinoma.

11. F.S.T. (Filarial Scrotal Tumour)

It is the mainfestation of filariasis involving the skin and

subcutaneous tissues of scrotum with or without the involvement of the skin of the penis. SKIN becomes THICKENED and INDURATED due to massive fibrosis and epithelial proliferation. The thickening is maximum at the bottom and minimum at the root of the scrotum. Pitting Oedema may be demonstrated in the early stages. A HYDROCELE is usually associated, but the fluctuation and transillumination tests are negative due to the thickened skin.

Skin of the penis may undergo the same changes leading to phimosis, RAM'S HORN PENIS or the buried penis.

Complications :

Infection, ulceration, warty excrescences and lymphorrhoea.

Blood tansfusion should be arranged to combat blood loss during surgery.

Treatment :

(a) Excision of the diseased scrotal and/or penile skin and subcutaneous tissue.

(b) Shaft of the penis is covered by the inner layer of prepuce and the split skin graft taken from the thigh.

(c) Testes (after everting the sac) are covered by the remnant of normal scrotal skin or implanted in the medial side of upper part of the thigh superficial to fascia lata.

(d) Wound is closed with a corrugated drain and indwelling (Foley's) catheter.

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VI. GROIN SWELLING

1. CLASSIFICATION

I. **Common Groin Swellings are :**

1. Inguinal hernia
2. Lymphadenopathy
3. Femoral hernia
4. Ectopic testis
5. Psoas abscess
6. Saphena varix.

II. **Classification :**

1. Swellings from the skin and subcutaneous tissues.
2. **The Hernial sacs** : (a) Inguinal hernia
   (b) Femoral hernia
3. **The testis and spermatic cord :**
   (a) Ectopic testis
   (b) Lipoma of the cord
   (c) Encysted hydrocele of the cord.
4. **The artery :** Ileofemoral aneurysm.
5. **The vein :** Saphena varix.
6. **The lymph nodes :** Lymphadenopathy due to infection, neoplasm etc.
7. **The Psoas sheath :** Psoas abscess.

III. **Relation of the swelling to the** INGUINAL LIGAMENT :

(a) **Above :** INGUINAL e.g. Inguinal hernia, Undescended testis.

(b) **Below :** FEMORAL e.g. Femoral hernia, Lymphadenopathy.

(c) **Above and in the scrotum :** INGUINOSCROTAL e.g. Inguinal hernia (funicular or complete). Congenital or encysted hydrocele, Funiculitis.

(d) **Above and below :** INGUINOFEMORAL e.g. Femoral hernia, Lymphadenopathy, Saphena varix, Ectopic testis.

IV. **Cardinal signs of Uncomplicated Hernia :**

(a) IMPULSE ON COUGHING.

(b) REDUCIBILITY.

(c) 'To get above the swelling test' is negative. c/f scrotal swelling.

V. **Some Important Points :**

- The patient must be examined both in recumbent position and in STANDING POSITION (for cough impulse).
- Besides hernia, cough impulse is present in cases of varicocele, saphena varix, lymph varix, ilcopsoas abscess and an undescended testis with an associated hernia.
- COUGH IMPULSE in hernia is EXPANSILE whereas in other conditions it is THRILL LIKE.
- Cough impulse is absent in irreducible, obstructed, strangulated hernias and also when the neck of sac is blocked by adhesions.
- In an obese patient, the adductor longus tendon should be traced to feel the pubic tubercle.
- The inguinoscrotal swelling is situated above and medial to the pubic tubercle, whereas the femoral swelling is below and lateral to the pubic tubercle.
- Cardinal features of STRANGULATED HERNIA are : TENSE, TENDER AND NO IMPULSE on COUGHING.
- TRANSILLUMINATION TEST is positive only in infantile or encysted hydrocele.

VI. **Aetiology of Hernias**

- 1. Congenital/primary.
  2. Secondary to raised intra abdominal pressure e.g. C.O.P.D., chronic constipation, bladder outlet syndrome, pregnancy, cysts, carcinoma (e.g. of left colon).
  3. Iatrogenic—incisional.
- The three common types of hernia to strangulate are, in order of frequency, femoral, indirect inguinal and umbilical.
- In Psoas abscess, fluctuation (cross across the inguinal ligament) should not be confused with reducibility.

2. INGUINAL HERNIA

Surgical anatomy : See operative portion.

The inguinal hernia may be 1. Indirect type
2. Direct type.

Indirect inguinal hernia :

- Traverses the INGUINAL CANAL from the deep to the superficial rings, LATERAL to the inferior epigastic artery.
- Usually congenital in origin but may arise in adolescence.
- May be acquired when the sac is formed as an outpushing of the abdominal peritoneum.
- May occur at the age.
- **Complete** (scrotal)—the hernia descends into the scrotum.
- **Incomplete :**
  - (a) BUBONOCELE : the hernia does not pass beyond the superficial ring, remains limited in the inguinal canal.
  - (b) FUNICULAR : the funicular process of peritoneum is closed at its lower end above the testis. The contents of the sac can be felt separately from the testicle. It is the COMMONEST type of inguinal hernia.
- Strangulation, obstruction may occur.

Direct inguinal hernia :

- Protrudes through the Hesselbach's triangle (bounded medially by the lateral border of rectus, laterally by the inferior epigastric vessels and below by the inguinal ligament).
- The neck of the sac lies medial to the inferior epigastric artery.
- Strangulation is rare because the neck of the sac is wide.

Contents :

1. **Omentocele** (Omentum) — feels doughy.
   - dull on percussion.
   - reduction easy initially but difficult at the end.
   - no gurgling sound during reduction.

2. **Enterocele** (Intestines) — resonant on percussion.
   — reduction may be difficult initially but easy towards the end.
   — reduces with a gurgling sound.
3. **Littre's hernia :** contains Meckel's diverticulum.
4. **Richter's hernia :** contains a part of the circumference of the intestinal wall.
5. **Maydl's hernia :** contains loops of intestine in the manner of "W" (hernia-in-W).
6. May contain a part of bladder wall or appendix or ovary with or without fallopian tube.

SLIDING HERNIA (HERNIA-EN-GLISSADE) : The posterior wall of the hernial sac is not formed by peritoneum alone but also by the SIGMOID COLON ON THE LEFT SIDE and the CAECUM ON THE RIGHT SIDE with or without a portion of urinary bladder on the medial aspect, on both sides.

Complications :

1. **Irreducibility** : due to adhesion between the contents and the sac.
2. **Obstruction** : irreducibility with features of intestinal obstruction-incarceration-retention of faeces in the large intestine in the sac.
3. **Strangulation** : irreducibility + intestinal obstruction + interference of blood supply to the contained intestine leading to gangrenous changes.

— the painful swelling becomes TENSE, TENDER WITH NO IMPULSE ON COUGHING.

4. **Inflammation (inflammed hernia) :**

— occurs when the sac contains either inflammed appendix or fallopian tube.

— can also occur in the terminal stage of strangulated hernia.

Clinical features :

1. **Age :** Indirect hernia can occur at any age.
   Direct hernia is more common in elderly persons.

2. **Sex :** DIRECT HERNIA practically NEVER occurs in the FEMALES.
3. **Pain :** Painless (ASYMPTOMATIC) or dull dragging discomfort (pain). Severe pain is complained of : (a) at the first appearance of the hernia (b) if the hernia becomes strangulated.
4. **Swelling :** In the inguinal or inguinoscrotal region—Intermittent—frequently present in the evening or after walking or straining.
5. **Impulse on coughing :** Expansile impulse is both visible and palpable.
6. Tenderness absent.
7. **Reducibility :** Indirect hernia reduces upwards and laterally. Direct hernia appears as direct forward bulge and reduces directly backwards.
8. **Invagination test :**

— Important to diagnose an early case of incomplete hernia (bubonocele).

— The index finger can be invaginated very gently into the neck of the scrotum and then into the superficial inguinal ring.

— In indirect hernia, the cough impulse is felt on the tip of the finger.

— In direct hernia, the impulse is felt on the pulp of the finger.

9. **Ring Occlusion Test** (POSITIVE IN INDIRECT TYPE) :

— The hernia is reduced and the pressure is applied over the deep ring (1.25 cm above the midinguinal point) with the thumb or the index finger and the patient is asked to cough.

— IN INDIRECT TYPE, HERNIA FAILS TO COME OUT due to occlusion of the ring.

— IN INDIRECT TYPE, HERNIA COMES OUT as the DEEP RING has nothing to do with it.

10. **"Rolled Silk" Skin :** The cord is gripped, and its constituents are allowed to slip one by one through the examining fingers. Thickening (due to hypertrophy of the cord) will be obvious on the side of the hernia.
11. **Superficial ring occlusion test :** After reduction of the hernia in a lying down position, the superficial ring is occluded and

the patient is asked to stand up. A hernia does not appear but a LYMPH VARIX on SAPHENA VARIX will fill up from below.

12. **Zieman's technique :** In the absence of obvious swelling at the time of examination, the index finger is placed over the deep ring, the middle finger over the superficial ring and the ring finger over the saphenous opening (4 cm below and lateral to the pubic tubercle). The patient is asked to cough. The cough impulse is felt in the following manner in different types of hernias.

    Indirect inguinal hernia : on the index finger.

    Direct Inguinal hernia : on the middle finger.

    Femoral hernia : on the ring finger.

Treatment :

See Operative portion.

3. FEMORAL HERNIA

SURGICAL ANATOMY : See operative portion.

1. Protrudes through the femoral canal.

   Presents as a mass at the level of the foramen ovale.

   May also turn upwards, once it has come out of the foramen ovale and can cross anteriorly to the inguinal ligament.
2. Common in females.
3. May present with a lump in the groin or a dragging pain, due to adhered omentum.
4. Usually small and therefore easily missed in the obese.
5. Likely to become strangulated due to rigid opening, tough and sharp Gimbernat's ligament forming the medial boundary.

   Ritcher's hernia, common.
6. Hernia lies BELOW THE MEDIAL END of the inguinal ligament.
7. Neck of the hernia lies BELOW AND LATERAL to the PUBIC TUBERCLE. (c/f inguinal hernia).
8. COUGH IMPULSE & REDUCIBILITY may be demonstrated.

Occasionally cough impulse is absent and the reduciblity is partial due to the adherence of the contents (omentum) to the peritoneal sac.

Complications :

1. Irreducibility.
2. Obstruction.
3. Strangulation.

Differential diagnosis of Groin swellings :

1. **Inguinal hernia** 2. **Femoral hernia**	– Site. – Expansile cough impulse. – Reducibility. – Relation to the inguinal ligament. – Relation to the pubic tubercle.

3. **Encysted hydrocele of the cord :**
   - Positive transillumination test.
   - Traction test positive.
4. **Ectopic testis :**
   - Empty scrotum.
   - Cough impulse and reducibility tests are usually absent.
   - U.S.G. may be helpful.
5. **Lipoma of the spermatic cord :**
   - Soft and lobulated and does not vary with coughing.
6. **Lymphadenopathy :**
   - Multiple and nodular.
   - Extends lateral as well as medial to the femoral vessels.
7. **Saphena varix**
   - Cystic swelling.
   - Emptied by pressure.
   - Disappears when the patient lies down.
8. **Psoas abscess :**
   - Usually lateral to femoral vessels.
   - Cross fluctuation positive.
   - Primary pathology in the spine or retroperitoneum.
9. **Iliofemoral aneurysm :**
   - Rhythmic expansile pulsation with a bruit or thrill.

4. MALDESCENT OF THE TESTIS

The testis develops from the genital fold below the kidney in the posterior abdominal wall and migrates down to its eventual position within the scrotum. Its migration is directed along its normal path by GUBERNACULUM, which develops as a condensation in the mesoderm of the plica inguinalis. By the 7th month it crosses the inguinal canal, by the 8th month reaches the external ring and by the 9th month or at birth descends into the scrotum.

(A) ECTOPIC TESTIS : Descent to an abnormal site.

Testis can follow aberrant (accessory) tails of the gubernaculum, possibly as a result of rupture of the scrotal tail and come to lie in the ectopic position e.g.

1. **Superficial Inguinal Pouch** (anchored)

   (space lined by loose areolar tissue superficial to the external oblique aponeurosis).
2. **Perineum.**
3. **Root Of Penis.**
4. **Femoral Triangle.**

(B) MALDESCENT OF THE TESTIS :

The descent may be arrested somewhere in its normal path from the abdominal wall to the scrotum.

(a) **Intra Abdominal testis :** Usually situated just above the deep inguinal ring.

(b) **In the Inguinal Canal :** Testis lies in the inguinal canal behind the external oblique aponeurosis.

(c) **In the Superficial Inguinal Pouch :** At the external inguinal ring.

The testes lying inside the ABDOMEN or in the INGUINAL CANAL are NOT PALPABLE.

(C) RETRACTILE TESTIS :

The scrotum is NORMALLY DEVELOPED and the testis can be brought down, by gentle manipulation or after crouching, TO TOUCH THE BOTTOM OF THE SCROTUM. (c/f incomplete descent).

Complications of Maldescent :

1. STERILITY in bilateral cases.
2. Increased risk of TRAUMA.
3. Associated inguinal HERNIA (70% of cases)
4. Increased risk of TORSION.
5. Epididymo-orchitis.
6. ATROPHY.
7. Increased risk of MALIGNANT disease.

Clinical features :

I. EMPTY SCROTUM.

II. PALPABLE testis with well developed scrotum ..... Retractile testis.

III. PALPABLE testis & ill developed scrotum :

(a) at the external inguinal ring—undescended testis.

(b) at the ectopic site—ectopic testis.

IV. IMPALPABLE TESTIS & ill developed scrotum : Undescended testis lying either in the inguinal canal or abdomen.

Investigation :

Ultrasonography.

Treatment :

The undescended or ectopic testis must be placed in the scrotum before puberty, otherwise irreversible damage (due to high temperature) will occur in the germinal epithelium.

Opertation is performed between the ages of 6 and 8 years.

The **operation consists of :**

1. Mobilising the spermatic cord.
2. **Orchidopexy :**

(a) **Dartos Pouch**.

(b) Narrowing the neck of the scrotum & fixation of testis to the bottom of the scrotum.

(c) **Keetely-Torek operation** : Two stage operation (a) fixation of the testis to the medial side of upper thigh (b) separa- tion of scrotum (with testis) from the thigh after 3 months.

(d) **Ombredanne's operation :** Testis is placed in the opposite scrotal compartment through the median scrotal septum.

(e) **Orchidectomy :** When the undescended testis is completely atrophic (after puberty) and the other testis is normal.

(f) **Orchio-Coelioplasty :** Abdominal replacement of the testis—when orchidopexy is found to be impossible and the contralateral testis has been removed previously.

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VII. OTHER HERNIAS

1. UMBILICAL HERNIA

EXOMPHALOS :

- MAJOR : Protruding abdominal contents are covered by the transparent membrane (remnants of the yolk sac). The umbilical cord is attached inferiorly. Untreated, this ruptures with fatal peritonitis.
- MINOR : Hernia sac is small and may contain a loop of intestine and the umbilical cord is attached to its summit.

UMBILICAL HERNIA :

Congenital :

- Herniation through the centre of umbilical scar.
- Fibrous ring palpable at the neck of the sac.
- Reducibility and impulse on coughing present.
- Spontaneous cure likely by the age of 2 years.

PARAUMBILICAL HERNIA (Acquired umbilical hernia) :

- Occurs just above or below the umbilicus.
- Common in obese multiparous women.

- Painless reducible swelling around the umbilicus.
- Impulse on coughing present.
- Often irreducible because of adhesions within the sac.
- Complications : irreducibility, obstruction and strangulation.

Treatment : MAYO'S OPERATION

Through transverse elliptical incision, excision of the umbilicus, herniotomy and transverse repair of the fascial defect by over lapping of the edge (double-breasting) of the rectus sheath done.

2. EPIGASTRIC HERNIA

- Protrusion of the extraperitoneal fat through the defect in the linea alba.
- May be multiple and asymptomatic.
- May present with a painful swelling.
- Pain may be confused with dyspepsia or chronic peptic ulcer.

Treatment : Repair of the defect.

3. INCISIONAL HERNIA (Ventral hernia)

Incisional hernia usually starts as a asymptomatic partial disruption of the deeper layers of a laparotomy wound.

- Usually begins in the early post-operative period.
- A SERO-SANGUINOUS discharge, the PINK FLUID SIGN, from the wound in the post operative period sometimes indicates disruption and is an indication for active intervention.

Predisposing factors are :

1. Old age, obesity.
2. Faulty operative technique.
3. Malnutrition or debilitation.
4. Wound infection.
5. Haematoma.
6. Increased intra abdominal pressure (distension) : e.g. ileus, ascites, repeated vomiting or pulmonary complications.

Treatment :

(a) **Palliative** : Abdominal belt.

(b) **Operation**

Pre-operative preparation :

- reduction of weight.
- treatment of chest infection.

Patients with massive hernia should be prepared carefully as the reduction of the contents into the abdominal cavity may precipitate PARALYTIC ILEUS from visceral compression and pulmonary complications from elevation of the diaphragm.

Principles of the Operation :

(a) Separation of adhesions and excision of the sac.

(b) Dissecting out and suturing the individual layers of the abdominal wall without tension. Tension-relaxing incisions may be required.

(c) PLASTIC FIBRE MESH OR NET CLOSURES : Deficiency in the abdominal wall is bridged by sewing in a sheet of PROLENE MESH or TANTALUM GAUZE.

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VIII. CONGENITAL ANOMALIES

1. MENINGOCOELE

It occurs due to protrusion of a pouch of dura mater through a congenital defect in the skull. Commonly it occurs in the (a) Occipital region or (b) at the root of the nose, or (c) in the trans-sphenoidal region, or (d) lumbosacral region (in spina bifida cystica).

- Present at birth.
- SWELLING : TENSE, ROUNDED, TRANSLUCENT with an IMPULSE ON coughing or CRYING.
- Impulse on crying or coughing may be absent if the neck of the sac is occluded by the growing skull.

Treatment :

Excision of the sac and repair of the defect.

2. SPINA BIFIDA

(A) **Occulta :**

- Due to failure of fusion of vertebral arches.
- Usually asymptomatic. No protrusion of cord or meninges.
- A local tuft of hair, naevolipoma or a dimple in the skin is suggestive.
- Accidental finding on X-ray.
- Usually no neurological deficit.

Neurological findings e.g. foot drop, enuresis can occur due to traction by membrana-reunions (a fibrous band connecting the skin to the spinal theca) or due to Diastematomyelia (splitting of the cord by a bony spur).

(B) **Cystica :**

(a) **Meningocoele :** This is a protrusion of meninges through a defect in the lumbosacral region. It contains only cerebrospinal fluid. It is usually not associated with any neurologic deficits.

(b) **Myelomeningocoele :** This is a protrusion of the dura mater and neural elements posteriorly as a result of incomplete closure of the spine. It may be associated with hydrocephalus secondary to Arnold-Chiari malformation. The cord or nerves can be seen as dark shadows on transillumination.

3. CLEFT LIP AND PALATE

Embryology : At about, the 6th week of intra-uterine life the stomodacum (primitive mouth) is surrounded from above by the FRONTO-NASAL PROCESS, from the side by the MAXILLARY PROCESSES and from below by the MANDIBULAR PROCESSES.

The Fronto-nasal process divides into one median nasal process and two lateral nasal processes. The fronto-nasal process forms the nose, the nasal septum, the nostril, the philtrum of the uppper lip and the premaxilla.

Cleft lip develops due to failure of fusion of the median nasal process with the maxillary processes.

The palate is formed by the fusion of two palatine plates of the maxillary processes together with the premaxilla developed from the fronto-nasal process.

(A) CLEFT LIP

1. May be (a) Unilateral (70% on the left side)
   (b) Bilateral (25%).
2. May be (a) Incomplete
   (b) Complete.
3. May be associated with cleft alveolus and/or cleft palate.
4. Associated with the FLATTENING and widening of the NOSTRIL on the same side.
5. Sucking (breast feeding or bottle feeding) is not greatly affected by a cleft lip.
6. Cosmetic problem.

Optimum age for operation :

- Should be operated BEFORE THE DENTITION starts (about 7 months).
- Operation is generally performed at about 3 months of age as determined by the "RULE of TENS" : 10 lb, 10 weeks of age and 10 gm of haemoglobin.

Operation :

- Various operations (some sort of 'Z' plasty) are practised to repair the cleft e.g.
  1. Millard operation.
  2. Mirault-Blair operation.

The most popular of these is probably Millard repair. Incisions are planned to create rotational and advancement flaps to bring the cupid's bow in normal position. The philtrum is re-formed and the nasal floor is constructed. An alveolar cleft, if present, should be closed at the same time as the lip repair. Logan's bow is sometimes used to avoid the tension on the suture line.

(B) CLEFT PALATE

1. May be : (a) Complete
   (b) Incomplete
   (c) Bifid uvula.
2. May be : (a) Uncomplicated
   (b) Complicated with cleft lip.

Problems :

1. Difficulty in sucking and eating.
2. Regurgitation of food into the nose.
3. Maldevelopment of the maxilla leading to dental crippling.
4. Nasal intonation (NASAL SPEECH).
5. Recurrent infection of the upper respiratory mucous membranes.
6. Deafness.

Optimum time of operation :

Operative repair is usually undertaken between the ages of 12 and 18 MONTHS i.e. before the CHILD BEGINS TO SPEAK.

Operation :

WARDILL-Kilner push back operation (the Four-FLAP operation) Mucoperiosteal flaps (with vascular pedicles) are raised from the palate with lateral relieving incisions and are pushed backwards and sutured in the mid line.

4. HYPOSPADIUS

It is a congenital anomaly in which the URETHRAL MEATUS lies on the VENTRAL surface of the penis, scrotum or perineum.

Development of Urethra :

1. From the internal urinary meatus to the prostatic utricle.
   (a) Anterior : from entodermal cloaca.
   (b) Posterior : from mesonephric duct.
2. From Prostatic utricle to the junction of membranous and bulbous part—from urogenital sinus.

3. The Penile Urethra (spongy part) : by the fusion of MEDIAL LABIAL FOLDS.
4. The glandular part : from the surface ectoderm of the glans.

The hypospadius develops as a result of imperfect fusion of medial labial folds or the failure of the growth of surface ectoderm of the glans. It is usually associated with downward curvature of the penis caused by a fibrous cord (CHORDEE), situated distal to the meatus.

The inferior aspect of the prepuce is poorly developed (hooded prepuce).

The hypospadius and phimosis can never co-exist.

Types :

1. **Glandular :** The ectopic opening is situated on the undersurface of the glans penis. The chordee is absent.
2. **Coronal** : The meatus is situated on the coronal sulcus.
3. **Penile** : The meatus is situated somewhere on the undersurface of the penis.
4. **Penoscrotal :** The meatus is situated at the junction of the penis with the scrotum.
5. **Perineal :** The scrotum is split in the middle and the meatus is situated between the halves. This type is sometimes associated with bilateral maldescended testes.

Treatment :

1. CHORDEE CORRECTION : (Straightening of the Penis), done betwen $1\frac{1}{2}$ and 2 YEARS of age.

– Transverse incision over the chordee, excision of the fibrous cord and verticle closure.

– The ectopic meatus recedes further proximally.

2. CONSTRUCTION OF THE URETHRA-DENIS BROWNE'S OPERATION : should be done BETWEEN 5 AND 7 YEARS of age.

– Perineal urethrostomy.

– U- shaped incision on the ventral surface of the penis,

round and behind the ectopic meatus, upto the base of the glans.

- Mobilization of the lateral skin flaps.
- Suturing of the flaps in the midline. Browne employed glass beads and soft aluminium tubing, which are crushed to hold the sutures in place.
- Relaxing longitudinal incision through the skin along the whole length of the dorsum of the penis.

3. ONE STAGE REPAIR (DUCKETT'S OPERATION) : by an island flap and rolled skin tube (or tube made from the inner layer of prepuce) is becoming more popular.

5. EPISPADIUS

- A rare condition where the ectopic external meatus is situated over the dorsal aspect of the penis. It may be :

1. Incomplete.
2. Complete, associated with Ectopia Vesicae.

6. ECTOPIA VESICAE (Extrophy of bladder)

It develops due to incomplete development of the lower abdominal wall and the anterior wall of the urinary bladder.

It is associated with an epispadius, poorly developed scrotum and wide separation of the pubic bones.

Complications include infection, ulceration, ascending urinary tract infection and adenocarcinoma.

There is buldging of the dark red bladder mucosa. The pale trigone with the ureteric orifices are found near the lower part of the protrusion. Urine is found to trickle continuously.

Treatment :

1. Diversion of urine into the colon.
2. Excision of bladder and diversion of urine into an ilcal conduit.
3. Iliac Osteotomy and closure of the abdominal wall.

IX. ORTHOPAEDIC CASES

1. MYOSITIS OSSIFICANS

1. Heterotopic bone FORMATION in the fleshy part of the MUSCLE.
2. **Mechanism**

— Avulsion of the periosteum.

— Haematoma formation under the stripped soft tissues-invasion by osteoblasts (Osteoprogenitor cells released by MASSAGE) : ossification.

3. **Types :**

(a) Myositis ossificans traumatica.

(b) Myositis ossificans progressiva.

4. **Sites :**

(a) **Anterior aspect of lower humerus :** BRACHIALIS muscle (after supracondylar fracture of the humerus or dislocation of the elbow).

(b) **Anterior aspect of the femur :** Quadriceps femoris muscle (after injury or fracture of the femur).

5. **Incidence :** More common in children and periosteum loosely attached to long bones.
6. **On examination :**

— The elbow fixed in flexion or the knee fixed in extension.

— A bony hard mass fixed to the underlying bone is felt.

— No pain, no tenderness.

— No joint movement.

7. **X-ray-fluffy mass of calcification :**

Alkaline phosphatase level may be raised in early stages.

8. **Prevention** : After injury no MASSAGE and no passive movement.
9. **Treatment :**

(a) Immobilisation in plaster slab for many weeks.

(b) Gradual mobilisation after cast removed.

(c) Operation to excise the mass if it hampers joint movements.

2. VOLKMANN'S ISCHAEMIC CONTRACTURE

1. Fibrosis of the FLEXOR GROUP OF MUSCLES of forearm resulting from ISCHAEMIA.
   - Partial VASCULAR OBSTRUCTION not lasting too long, otherwise gangrene.
2. **Pathogenesis** : Partial vascular obstruction-ischaemia-necrosis-fibrosis-contracture.
3. **Causes :**
   (i) SUPRACONDYLAR FRACTURE of humerus, proximal fragment injuring brachial artery.
   (ii) Tight forearm plaster or bandage.
4. **Clinical features :** Common in children.
   (a) Initial stage—stage of ischaemia
      - Pain, pallor, pulselessness, paralysis and puffiness (oedema).

   (b) Forearm thin and wasted, muscles feel hard and taut.
   (c) VOLKMANN' EFFECT (fixed length phenomenon)
      - When the WRIST is flexed, FINGERS are EXTENDED and when the WRIST is EXTENDED, FINGERS are FLEXED.

   (d) Fully developed stage : 'Claw Hand'.
      - Interphalangeal joints flexed and metacarpophalangeal joints extended.
      - Thumb adducted and forearm pronated.
5. **D/D :**
   (i) Ulnar and median nerve palsy.
   (ii) Dupuytren's contracture.
6. **Treatment :**
   (a) **Stage of ischaemia :** Treatment of supracondylar fracture.
      - Treatment of vascular damage—if indicated.

(b) **Developing stage :** Physiotherapy

- Active movement of fingers.
- Spring splints.

(c) **Developed stage :**

(i) Max-page muscle sliding operation.

(ii) Excision of fibrous tissue with subsequent transplantation of healthy muscle.

3. DUPUYTREN'S CONTRACTURE

1. Diffuse FIBROSIS of the PALMAR APONEUROSIS characterised by formation of nodules and cords alongwith FLEXOR CONTRACTURE of the metacarpophalangeal joint and proximal interphalangeal joint commonly of the ring and little fingers.
2. **Aetiology :**
   - Unknown
   - May be familial.
   - Common in persons, subjected to REPEATED TRAUMA or pressure over the palm e.g. in gardeners.
3. **Associated Pathology :**
   (i) Plantar fibromatosis
   (ii) Peyronie's disease (fibrosis of the corpus cavernosum)
   (iii) Epilepsy (patient on phenytoin)
   (iv) Alcoholic cirrhosis
   (v) Pulmonary tuberculosis
   (vi) Garrod's pad (Knuckle pad)
   - thickening of skin of proximal interphalangeal joints.
4. **Clinical features :**
   - Middle-aged males.
   - Usually bilateral.
   - Difficulty in grasping.
   - Firm nodule just below the base of ring finger.
   - Formation of linear bands or cords extending into the 4th and/or 5th fingers.

- Flexon deformity, prevention of full extension at M.P. and P.I.P. joints.
- Adherent skin dimpling.
- May be associated plantar fibromatosis and Knuckle pad over P.I.P. joint.

5. **D/D :**
   (a) Volkmann's ischaemic contracture (wrist joint flexion does not produce full extension of the fingers in dupuytren's contracture).
   (b) Post-traumatic or post-infective deformity.
6. **Treatment :** When needed, minimum surgery to restore maximum function.
   (a) Early cases—gentle stretching and night splintage, local hydrocortisone infection.
   (b) Subcutaneous fasciotomy (closed).
   (c) Partial fascicctomy.
   (d) Total fasciectomy.

4. DE QUERVAINS TENOVAGINITIS

1. Pain and swelling (nodule) over the radial STYLOID PROCESS due to TENOVAGINITIS of ABDUCTOR POLLICIS LONGUS and EXTENSOR POLLICIS BREVIS tendons.
2. The fibrous sheaths of the abductor pollicis longus and extensor pollicis brevis tendons are thickened when they cross the radial styloid.
3. **Clinical features :**
   - Middle aged female.
   - Pain radial aspect of the wrist worst during wringing clothes.
   - Localised tender THICKENING or NODULE palpable.
   - ULNAR DEVIATION of the wrist PAINFUL.
   - Passive ADDUCTION of THUMB PAINFUL (Finkelstein test).
   - Active extension and/or abduction of the thumb against resistance painful.

– Crepitus with movement of the tendons be palpable (wet leather sign).

4. **Treatment :**

(a) **Conservative :**

(i) LOCAL STEROID INJECTION

(ii) NSAIDS

(iii) Heat therapy

(iv) Ultra sound application.

(b) **Operative :** Division of the involved tendon sheaths (teno-synovectomy)

5. TRIGGER FINGER

1. STENOSIS of the fibrous sheaths of the FLEXOR TENDON opposite the metacarpal heads. On forced extention, the tendon passes the constriction with a snap (snappig finger).
2. May co-exist with

   Carpel tunnel syndrome.

   De-quervain's tenovagintis.
3. RING and MIDDLE fingers commonly affected.
4. **Clinical features :**
   - Pain and tenderness at the base of the finger.
   - LOCKING of the fingers in FULL FLEXON.
   - EXTENSION of the affected finger by voluntary effort or by the other hand produces CHARACTERISTIC SNAP.
5. **Conservative :**

   (a) Local steroid injection.

   (b) Division of the involved fibrous sheath.

6. MALLET FINGER (Baseball finger)

1. Fixed FLEXON DEFORMITY of the DISTAL INTERPHALANGEAL JOINT of a finger as a result of RUPTURE of the EXTENSOR TENDON at its insertion into the base of the distal phalanx with or without AVULSION of a piece of BONE from the distal phalanx.

2. **Cause :**
   - Sudden, acute FORCEFUL flexon of an EXTENDED FINGER e.g. a ball striking the tip of the finger.
3. **Clinical features :**
   - History of trauma.
   - Patient UNABLE to ACTIVELY EXTEND the distal interphalangeal joint.
   - DISTAL INTERPHALANGEAL JOINT of the affected finger rests in moderate flexon (about 25^{0}).
   - Tenderness at the site of avulsion.
   - X-ray to rule out AVULSION FRACTURE of the base of the distal phalanx.
4. **Treatment :**
   (a) Conservative PLASTER CAST with the DISTAL inter-phalangeal joint extended and proximal interphalangeal joint in FLEXION at 60 to 80 degrees.
   (b) Operative fixation of the avulsion fracture (K-wire fixation) may be required.
   (c) Injury more than 3 weeks—Operative treatment rarely helps. Patient should accept the deformity and ignore it.

7. CARPEL TUNNEL SYNDROME

1. Features of MEDIAN NERVE COMPRESSION due to increased pressure in the CARPEL TUNNEL.
2. **Surgical anatomy of carpel tunnel :**
   - Roof formed by the flexor retinaculum.
   - Floor by the carpal bones.
   - Structures passing through :
     (a) Flexor digitorum superficialis and profundus tendons with their synovial sheaths (ulnar bursa).
     (b) Flexor pollicis longus with its synovial sheath (radial bursa).
     (c) Median nerve, on the lateral side, between superficialis tendon and flexor carpi radialis.

3. **Causes of Compression :**
   (a) Rheumatoid arthritis, Osteoarthritis.
   (b) Pregnancy, Menopause—due to swelling of the tendon sheaths.
   (c) Thickening after fracture of lower end of the radius.
   (d) Tuberculous tenosynovitis (compound palmar ganglion).
   (e) Myxoedema.

4. **Clinical features :**
   - Common in middle aged females.
   - May be associated with PREGNANCY, MENOPAUSE, RHEUMATOID, TENOSYNOVITIS or Myxoedema etc..
   - Pain and paraesthesia along the distribution of median nerve e.g. RADIAL THREE AND HALF FINGERS.
   - BURNING PAIN, TINGLING or NUMBNESS forces the patient to wake up in the middle of the night.
   - HANGING THE ARM by the SIDE OF THE BED brings relief.
   - Often clumsiness and difficulty with fine movements like sewing.
   - May be wasting of the thenar eminence.
   - Pain may radiate up the arm.
   - Passive muscle stretch test causes severe pain.
   - Altered sensation in median nerve arch.

5. **Investigations :**
   (a) X-ray cervical spine to exclude cervical spondylosis and cervical rib.
   (b) C.T. Scan.
   (c) Nerve conduction studies.

6. **Treatment :**
   (a) Local corticoids injection into flexor sheath.
   (b) Operation (treatment of choice) : Decompression of the median nerve by longitudinal division of the flexor retinaculum. Operation causes dramatic relief.

8. ENTRAPMENT NEUROPATHY

(Other sites of Compartment syndromes) Besides Carpal tunnel syndrome (median nerve), are :

- Epicondylar tunnel at elbow (ulnar nerve).
- Guyon's canal at wrist (ulnar nerve).
- Tarsal tunnel (posterior tibial nerve).
- Inguinal ligament (lateral cutaneous nerve of thigh)—meralgia paraesthetica.

9. PAINFUL ARC SYNDROME

The supraspinatous, infra spinatous, subscapularis and teres minor tendons blend with the capsule of the shoulder joint to form a cuff (the rotator cuff).

The causes of painful arc syndrome are :

(a) Chronic supraspinatous tendinitis.

(b) Incomplete rupture of the supraspinatous tendon.

(c) Sub-acromial bursitis

(d) Crack fracture of the greater tuberosity.

Clinically :

(a) Tenderness below the acromion process.

(b) Characteristic jerk during the mid abduction.

(c) X-ray may show calcification just above the greater tuberosity.

10. FROZEN SHOULDER
(Periarthritis or Adhesive capsulitis)

1. Pain and uniform limitation of all movements of the shoulder joint due to thickening of the entire tendinous cuff and obliteration of the intra-articular 'gusset' of the capsule by adhesions.
2. The tendinous cuff becomes thick, vascular and infiltrated with lymphocytes and plasma cells.
3. **Three phases :**

   (a) Increasing pain and increasing stiffness.

   (b) Decreasing pain and persistent stiffness.

(c) Painless return of full movement.
Each phase lasting for 4-8 months.

4. **Clinical features :**
   - Pain typically felt at deltoid insertion, with radiation along the arm.
   - Tenderness, below the acromion process or in front.
   - Restriction of both active and passive movements.
5. X-ray—Normal.
6. **Differential diagnosis :**
   (a) Tuberculosis (caries sicca)
      - Wasting much more marked
      - X-ray—bone destruction.

   (b) Post-traumatic stiffness.

   (c) Osteoarthritis.
7. **Treatment :**
   - Analgesics, Anti-inflammatory.
   - Heat therapy.
   - Exercises.
   - Local injection of hydrocortisone.
   - Manipulation under anaesthesia.

11. TENNIS ELBOW

1. Pain and tenderness at the lateral epicondylar region of the elbow, possibly due to partial rupture of common extensor origin from the lateral epicondyle.

   Note : GOLFER'S ELBOW : Similar to tennis elbow where the flexor origin from the medial epicondyle is affected.

2. **Clinical features :**
   - Pain over the lateral epicondyle, radiating down the back of the forearm.
   - Tenderness over lateral epicondyle.
   - Pain on passive stretching i.e. by holding the elbow straight, the forearm prone and the wrist palmar flexed.

3. **Treatment :**
   - Rest.
   - Analgesics.
   - Short wave diathermy.
   - Local hydrocortisone injection.

12. TALIPES EQUINOVARUS (Club foot)

1. The Congenital talipes equinovarus deformity consists of
   (a) Equinus – The heel drawn up by a tight tendoachillis.
   (b) Varus – The sole facing medially.
   (c) Adduction of the forefoot.
2. May be associated with congenital neuro muscular anomalies e.g. spina bifida and arthrogryphosis.
3. May be secondary to anterior poliomyelitis.
4. **Clinical features :**
   - Common in boys often with a familial trend.
   - May be bilateral.
   - Typical deformity consisting of three elements detected on examination.
   - Painful passive movements of the foot.
5. **X-ray :**
   - Shape and position of the talus may be useful in assessing treatment.
6. **Treatment :**
   (i) STRETCHING AND STRAPPING : in reversed direction of deformity–repeated attempts.
   (ii) DENIS BROWNE SPLINTS AT NIGHT.
   (iii) MANIPULATION AND PLASTER extending upto the thigh with knee flexed to 90 degrees.
   (iv) Resistant case should be operated upon by six weeks.
   - MEDIAL RELEASE of the soft tissues and ELONGATION of tendoachillis.

(v) After the age of 5 years medial release with the excision of a lateral segment of bone including calcaneo-cuboid joint.

— After the age of 12 years—E.T.A. + medial release with triple arthrodesis (subtalar talonavicular and calcano-cuboid joints).

13. OSTEOARTHRITIS OF KNEE

1. Degenerative wear and tear process of the knee joint.
2. Common in elderly people, mainly elderly obese females.
3. Predisposing factors leading to early onset of Osteoarthritic process.
   (a) Congenital anomalies e.g. Bow leg, Knock knee.
   (b) Previous injury involving the articular surfaces.
   (c) Previous intra articular mechanical damage e.g. Osteochondritis dissecans, Torn menisci.
   (d) Previous disease process e.g. Rheumatoid arthritis, Infective arthritis.
4. **Pathological changes :**
   (a) The cartilage becomes rough, fibrillated and thinned at the pressure areas.
   (b) The bone beneath the cartilage may be sclerosed.
   (c) The cartilage proliferates and calcify at the periphery-forming osteophytes.
   (d) Proliferation of the synovial membrane with excess fluid formation.
5. **Clinical features :**
   (a) Pain and morning stiffness which gradually passes off in the evening.
   (b) Movements slowly become more and more restricted.
   (c) Knee joint slightly thickened.
   (d) Tenderness and fluctuation (Patellar tap) may be elicited.
   (e) Rim of osteophytes palpated at joint margins.
   (f) 'Grating' (crepitus) felt/heard on movement.

6. **X-ray :**
   - Narrowing of joint space.
   - Osteophytes at joint margins.
   - Sclerosis of subchondral bone.
   - Loose body opacities.
7. **Treatment :**
   (a) Conservative
   - Analgesics
   - Local heat therapy
   - Physiotherapy, exercises (quadricep drill)
   - Intra articular injection of hydrocortisone.

   (b) Surgical :
   - Arthroscopic removal of loose body
   - Upper tibial osteotomy
   - Excision of Patella
   - Arthroplasty or arthrodesis rarely indicated.

14. TUBERCULOUS DACTYLITIS (Spina Ventosa)

1. Tuberculous infection of the metacarpals, metatarsal or phalanges.
2. Blood-borne infection, reaching the middle of the body by the way of the nutrient artery.
3. Spongy bone in the shaft is replaced by tuberculous granulation tissue.
4. The periosteum is raised and successive layers of one bone are deposited under it.
5. **Clinical features :**
   - Patient is usually a child.
   - History and findings suggestive of a primary tuberculous focus.
   - Fusiform swelling of the bone.
   - Pain and tenderness usually present.
   - Cold abscess or sinus may be present.

6. **X-ray** : shows rarefaction and ballooning of the affected bone.

7. **Differential diagnosis :**

   (a) Enchondroma
   - little or no new bone.
   - non-fusiform swelling.

   (b) Syphilitic dactylitis
   - more new bone formation.
   - no rarefaction.
   - serological tests positive.

8. **Treatment :**
   (a) Antituberculous treatment.
   (b) Immobilisation.
   (c) Removal of sequestrum with scrapping of the cavity.

15. INGROWN TOE NAIL

1. Common in the big toe.

   Note : Nail bed lesions
   - Subungal haematoma
   - Subungal exostosis
   - Melanoma
   - Glomus tumour.

2. Some persons are more prone to have ingrowing toe nails.
3. The nail either on the medial or the lateral side impinges on the skin underlying it (nail sulcus).
4. Mechanical irritation followed by infection, ulceration and suppuration (pus).
5. **Clinical features :**
   - Pain and inability to toe touch phase of walking.
   - Redness, swelling, tenderness and discharge at the skin fold.
   - Diabetes and Peripheral arterial disease should be excluded.

6. **Treatment :**

(a) ***Conservative*** :

- Correct trimming (cutting the nails square).
- Keeping the feet dry and clean.
- Placing of cotton wool, soaked in spirit, beneath the corner of the nail.

(b) ***Operation*** :

(a) Avulsion of the nail to establish free drainage of pus.

(b) Partial or complete excision of the nail together with the margin of the skin fold.

(c) Recurrent cases may require

- Nail-bed ablation operation (Zadik's operation).

16. OSTEOMA

(A) **CANCELLOUS OSTEOMA** (exostosis)

1. Minor disorder of growth rather than a true tumour.
2. Conical lump of bone with a cap of cartilge pointing away from the growing end.
3. Growth of the lump stops when bone growth ceases. No metastases.
4. Diaphyseal aclasis-Metaphyses look irregular with multiple exostoses.
5. **Clinical features :**

(a) Painless, bony hard lump at the growing end of a long bone.

(b) Common site—upper end of humerous, lower end of radius or ulna, lower ends of femur, tibia or fibula.

(c) Usually asymptomatic.

(d) May cause pressure over the neurovascular bundle or interfere with tendon action.

(e) **X-ray**—Medulla and cortex of the tumour are continuous with the affected bone via a broad base at the metaphysis.

6. **Treatment :** Excision, if causing symptoms.

(B) **COMPACT OSTEOMA** (IVORY OSTEOMA) :

1. Benign bony growth from the precartilaginous cells of epiosteum.
2. No metastases.
3. Common site—skull, outer table or inner table (cause focal epilepsy).
4. Hard painless lump.
5. **X-ray** : sessile dense bone with well circumscribed edge.
6. **Treatment** : Excision with a small area of surrounding bone as the tumour is very hard.

17. CHONDROMA

1. Benign tumour originating from the precartilagenous cells of the bone.
2. **Common sites** : Short pipe bones e.g. metacarpals, metatarsals and proximal phalangss.

   Other rare sites — Long bones.

   — Pelvic bones and scapula.
3. **Types :**
   (a) Enchondroma
   - Tumour entirely within the medulla.
   - Cortex ballooned and thin.

   (b) Ecchondroma—rare.
   - Tumour partially or completely on the surface of the bone.
4. **Clinical presentation :**
   - Young adult.
   - Painless bony hard swelling.
   - More commonly with a pathological fracture.
5. **X-ray :**
   (a) Cortex expanded and thinned out.
   (b) Irregular specks of calcification, c/f bone cyst.
6. **Treatment :** Excision of the tumour.

18. OSTEOCHONDROMA

1. Common tumour, of the bone, arising from the precartilagenous cells in the metaphyseal region of a long bone.
2. **Commonest site** : bones at the knee joint.
3. Presents as a big lobulated mass with a cartilagenous cap and often a bursa at the top.
4. Some consider it a cancellous osteoma, but it differs from a cancellous osteoma as it is more sessile, more lobulated and has a massive cartilagenous cap.
5. **Clinical features :**
   - Age—10 to 25 years of age.
   - Painless, nontender, bony hard lump attached to the bone.
   - Sometimes, may present with symptoms e.g. inflammation of the bursa, pain, interference with tendon action or pressure on a nerve.
6. **X-ray :**
   (a) Lobulated bony mass with broad base and with areas of calcification.
   (b) Ill-defined outlines of the cortex and medulla (c/f—cancellous osteoma).
7. Malignant change (Osteosarcoma) may occur.
8. **Treatment :**
   - Excision of the tumour.

●

Section 2

OPERATIVE SURGERY

1. STERILISATION

DEFINITIONS :

Sterilisation is a process whereby all living organisms including spores are destroyed whereas **disinfection** is a process which destroys only the vegetative forms of organisms but does not kill the spores.

Antiseptic surgery aims at killing the micro-organisms present in the wound by the use of antiseptics (strong chemicals).

Aseptic surgery (Asepsis) is the technique employed i.e. sterilisation of all articles coming into contact with the patient, whereby micro-organisms are prevented from gaining access to uninfected tissues.

BLUNT INSTRUMENTS :

These are sterilised by either of the following methods :

1. **Boiling in** boiling water for atleast 45 minutes.
2. **Autoclaving** (Steaming under pressure).

   Usually a heat of 120^{o} with 15 lb pressure for 30 minutes.
3. **Formalin vapour steriliser :** This useful apparatus is also used for sterilisation of all instruments.
4. When an instrument is very urgently required to be sterilised, it may be exposed to direct heat i.e. **flaming.**

SHARP INSTRUMENTS :

These are sterilised with chemicals. Commonly used **chemicals** are :

(a) **Lysol :** Sharp instruments (scissors, blades, needles etc.) are usually put in concentrated lysol for atleast half an hour. Before use, after taking out of lysol solution with Lifter, the instrument must be thoroughly rinsed with sterile water.

(b) **Cidex** (2% glutaraldehyde) : Instruments (even blunt instruments, endoscopes etc.) can be put in activated

solution for sterilisation. Time required for destruction of pathogenic spores is 4 to 10 hours. Time required for distinction is only 15 minutes.

LINEN :

Draping sheets, gowns, gloves, etc. are sterilised by autoclaving.

CATHETERS :

Rubber drains, rubber tubes are sterilised by boiling or autoclaving for 10 minutes.

2. SUTURE MATERIALS

An ideal suture should be strong but slender, flexible to apply & comfortable. It should be smooth on surface so that it offers no cavities for bacterial growth. It should be non-reactive & have good knotting security.

ABSORBABLE SUTURES

1. **NATURAL : Catgut**

It is from the submucosa of sheep intestines. (The word catgut has possibly come from kit gut which means the string of the violin).

Processing & Sterilisation :

(a) The submucous coat of the sheep intestines is washed with ether to dissolve fat.

(b) Then it is immersed in carbolic acid for 8 days so that the spore bearing organisms are destroyed.

(c) It is supplied in airtight packs containing 70% alcohol (as preservative) & 5% glycerine (which keeps it soft).

Plain catgut : It is absorbed in the tissues within a week.

Chromic catgut : It is obtained by processing the catgut in salts of chromic acid for a variable period. Chromic or chromicised catgut remains in the tissues for 10 to 40 days.

As time passes catgut is absorbed by enzymatic digestion.

The size of the catgut is according to its thickness (e.g. 4/0, 3/0, 2/0, 1/0, 1,2).

Advantages :

The advantage of catgut is that it is absorbed in the tissues therefore can be used even in the presence of infection.

Disadvantages :

(a) It is a foreign protein & may cause tissue irritation, necrosis & infection (stitch abscess, catgut sinus).

(b) The tensile strength diminishes after 3-4 days.

2. **SYNTHETIC** :

(a) DEXON (homopolymer of glycolide)

(b) VICRYL (copolymer of glycolide & lactide)

(c) P.D.S. (homopolymer of polydioxanone).

They have prolonged absorption time (more than 90 days) and cause minimal tissue reaction but knotting qualities are less satisfactory.

NON ABSORBABLE SUTURES

E.g. Thread (cotton or linen), silk, polyester, polyamide, polypropylene, polyethylene, steel. They may be in the shape of monofilament, multifilament, braided or twisted.

Thread, silk etc. can be sterilised by boiling or autoclaving.

Commonly used non-absorbable suture materials are thread, silk (for skin suture, ligation of blood vessels etc.) & prolene.

PROLENE (Monofilament polpropylene) : is used for Hernia repair, suturing of sheath, tendon etc. Steel wire is used for suturing (fixation) fractured bony ends e.g. patella, olecranon, sternum, and also in dental surgery (Inter dental wiring for fracture mandible).

3. NOMENCLATURE OF OPERATIONS

1. The suffix **"Otomy"** denotes making an opening into a hollow organ or cavity & closing it after dealing the pathology e.g. laparotomy, gastrotomy.

2. The suffix **"Ostomy"** denotes making an opening into a cavity & maintaining it to the exterior e.g. colostomy, tracheostomy.

3. The suffix **"Ectomy"** denotes excision or removal of some structure e.g. cholecystectomy, orchidectomy.

4. The suffix **"Lysis"** denotes mobilization of an organ e.g. neurolysis.

5. The suffix **"Pexy"** denotes fixation of the organ in its normal anatomical position e.g. orchidopexy.

6. The suffix **"Plasty"** denotes plastic operations for reforming a structure e.g. pyloroplasty, urethroplasty.

4. PLAN OF OPERATION

Operation may be :

1. **Elective surgery :** i.e. planned procedure e.g. cholecystectomy, hernioplasty.

2. **Emergency surgery :** where urgent intervention is required, e.g. strangulated hernia, perforated peptic ulcer.

In any Operation :

1. **Pre-operative assessment and preparation** : Routine investigation e.g. haemogram, urinalysis, correct anaemia, treat chest infection or any septic focus, control diabetes if present.

2. **Shaving and antiseptic dressing** in the ward.

3. **Choice of anaesthesia & Premedication—**

I. General

II. Local

General	Local
Atropine (0.65 mg) or Glycopyrolate	Pethidine (100 mg)
Phenergan (50 mg) Diazepam	Phenergen Diazepam Pentazocine

4. **Position of the patient :** Supine
   Lateral
   Kidney position
   Lithotomy position for perineal surgery.
   – For Neck surgery sand bag between the shoulder blades.
5. **Skin preparation :** Savlon (Cetrimide & Chlorhexidine)
   Tincture iodine, Bovidone iodine.
6. **Towelling.**
7. **Skin incision.**
8. **Procedure and findings.**
9. **Drainage tube,** if required : Tube drain
   Corrugated drain
   Suction drain (Redivac or portavac).
10. **Closure.**
11. **Post operative management.**

5. ANAESTHESIA

1. GENERAL ANAESTHESIA

Reversible loss of conciousness and sensations with muscle relaxation and abolition of reflexes.

1. **TYPES :**
   (i) **Spontaneous :** The patient breathes himself.
   Drugs used are :
   (a) Halothane
   (b) Ether
   (c) Trichloroethylene.
   (ii) **Controlled :** The anaesthetist ventilates patient after using the muscle relaxants.

Oxygen and Nitrous Oxide are used alongwith other agents (drugs).

(a) Depolarising, (b) Non-depolarising.

2. **PRE-OPERATIVE EVALUATION :**

(a) **Routine investigations** : Haemogram, Blood Sugar etc.

- X-Ray Sugar etc.
- E.C.G. for patients above 35 years.
- Renal function and Liver function tests in selected cases.

(b) **Specific medication :**

- Control of diabetes (by insulin), hypertension and chest infection.
- Correction of anaemia.
- History of taking medications.

3. **OVER-NIGHT** (or 6 to 8 hours) fasting prior to surgery as :

(a) Protective reflexes are abolished under General anaesthesia.

(b) To prevent regurgitation : Aspiration.

4. **PRE-ANAESTHETIC MEDICATION :**

(a) **Sedatives** to allay anxiety of the patient e.g. Diazepam, Nitrazepam etc.

(b) **Anti-Cholinergic drugs :**

(i) Atropine, 0.6 mg. I.M. given 30 to 40 minutes before surgery.

Or

(ii) Glycopyrrolate (Atropine substitute), 0.02 mg./kg.

Advantages : (a) Tachycardia much less.
(b) C.N.S. toxicity absent.

(c) **Analgesics and Sedatives** e.g. Pentazocine 0.5 mg/kg. I.M. or Diazepam.

(d) **Broncho dilators and Corticoid**, if indicated.

5. **INDUCTION AGENTS :**

(a) **Sodium-pentothal** (Ultra short acting barbiturate) :

Dose I.V.—4 mg./kg.

(b) **Methohexitone** (methylated thiobarb) :

Dose I.V.—1 mg./kg.

(c) **Ketamine hydrochloride :**

Duration of action I.V.—15 minutes

I.M.—30 minutes.

Causes dissociative anaesthesia—higher centres are dissociated from reticular activating system.

Dose : Induction—0.5-2 mg/kg. I.V.

4-6 mg./kg. I.M.

Advantages :

(i) Good analgesia.

(ii) Total amnesia and Catalepsy.

Disadvantages :

(i) Severe hallucinations.

(ii) Increases heart rate and Blood Pressure.

Contraindications :

(i) Increased intra-cranial pressure.

(ii) Ischaemic heart disease.

(iii) Psychiatric patients.

(d) **Diazepam,** Phenergan, Fentanyl, Droperidol etc. are sometimes used.

6. **METHOD OF INDUCTION & INTUBATION**
(Common to both Procedures—Spontaneous & Controlled)

(i) I.V. drip.

(ii) Check pulse, B.P. and air entry.

(iii) Pulse Oxymeter and E.C.G. leads are placed in position in selected cases.

(iv) Sodium pentothal is given slowly I.V. while monitoring the pulse.

End point checked by eyelash/eyelid reflexes.

(v) Scoline 1.5-2 mg./kg. I.V. given

(vi) Continue oxygenation.

(vii) Intermittent positive pressure respiration with a reservoir bag—till total paralysis is evident (Patient cannot breathe himself).

(viii) Endo-tracheal intubation is done with the help of Laryngoscope.

(ix) ETT is connected to Maggil's circuit (Boyl's machine).

(x) After 2-3 blasts of 100% Oxygen, N_2O is started, ratio being 60 : 40.

(xi) Air way is passed.

7. SPONTANEOUS ANAESTHESIA :

(i) Start halothane/ether through the Boyl's machine/ Vaporisers after the above mentioned induction and intubation.

(ii) Once the patient starts breathing, stop ventillating (effect of scoline, the short acting relaxant, passes off within few minutes).

(iii) Maintain the level of anaesthesia.

(iv) At the end of the operation

(a) stop anaesthetic agent,

(b) do an oral suction,

(c) wait for the return of pharyngeal reflexes,

(d) remove endo-tracheal tube.

8. CONTROLLED ANAESTHESIA :

- Non-depolarising, long acting muscle relaxants e.g. gallamine or pancuronium etc. are used, to paralyse the patient.
- Ventillation is continued throughout with O_2 & N_2O.
- Neostigmine I.V. is given at the end of the operation for the reversal of the effects of relaxant.
- Ventillation is continued till spontaneous respiration sets in.
- Endotracheal tube is removed after oral suction and return of reflexes.

(Check muscle power by protrusion of tongue).

9. **COMPLICATIONS :**

(a) **Aspiration** (Mandelson's syndrome)

— Chemical pneumonitis.

— H_2 antagonist antacids etc. may be given as preventive measure.

(b) **Cardiac arrest :** Because of anaesthetic agents like Pentothal or hypotension and hypoxia.

(c) **Post recovery** : nausea, vomiting and aspiration, hypotension.

(d) **Intubation :** trauma to vocal cords.

(e) **I. V. line** : haematoma, thrombophlebitis, air embolism.

(f) **Pulmonary :** bronchospasm, chest infection.

2. LOCAL ANAESTHESIA

1. **Definition :**

Temporary loss of sensation and relief of pain due to depression of nerve conduction beyond the point of application in a restricted area of body.

2. **Methods :**

Surface anaesthesia (topical).

Infiltration anaesthesia.

Field block.

Nerve block.

Spinal anaesthesia.

Epidural anaesthesia.

3. **Principles :**

(a) Proper knowledge of the regional anatomy.

(b) Proper local anaesthetic agent :

(i) Sufficient concentration.

(ii) Duration of surgery (1 to 2 hrs.)

(c) Patient's wish.

(d) Contraindications and history of allergy.

(e) Resuscitation measures ready.

4. **Drug :**

(A) Xylocaine (Lignocaine)

Concentration :

- Infiltration : 0.5 to 1%
- Nerve block : 2%
- Jelly : 5%
- Ointment : 5%
- Topical : 4%

(B) Bupivacaine (Sensorcaine)

Concentration : 0.25 to 1%

For local blocks, infiltration & sustained action.

5. **Dose :**

Xylocaine : (a) Without adrenaline = 3 – 5 mg./kg.

(b) With adrenaline = 5 – 7 mg./kg.

Duration : (a) Without adrenaline = 45 mins to 1 hour.

(b) With adrenaline = 1 – $1\frac{1}{2}$ hours.

Sensorcaine : Dose – 2 mg./Kg.

Note : Adrenaline (1 : 2,000) : causes Vasoconstriction, hence less oozing and delayed absorption.

Contraindicated in Hypertension & Myocardial infarction.

6. **Complications :**

Over dosage—Causes restlessness, vertigo, tremors and **convulsions**, hypotension, cardiac failure and/or respiratory failure.

Management is done by :

(a) I.V. diazepam/Pentothal.

(b) Short acting muscle relaxants.

(c) Ventillation.

(d) I.V. fluid & Vasopressor drugs.

3. SPINAL ANAESTHESIA

1. **Definition :**

A technique, which causes complete blockade of the anterior and posterior nerve roots and the autonomic ganglia, by the

introduction of a local anaesthetic agent into the subarachnoid space through an intervertebral space.

2. **Indications :**

   (i) Surgery below the umbilicus, specially pelvic surgery, surgery on the lower limb, hernia repair, prostatectomy etc.

   (ii) Patients in whom general anaesthesia is contraindicated e.g. in C.O.P.D. patients.

3. **Contraindications :**

   Septicaemia, shock, spinal cord lesions, Local skin infection & Bleeding disorders.

4. **Drug :** Xylocaine 5% (2 c.c.)
   Or
   Bupivacaine.

5. **Technique :**

   (a) ***Position***

   (i) Sitting on the edge of the operation table with complete flexion of the neck and trunk.

   (ii) Lateral : Lower limb flexed at the knee joint as far as possible with complete flexion of the neck and trunk.

   (b) Part is prepared and infiltrated with Xylocaine (0.5 to 1%). A spinal needle is introduced into the L_4-L_5 intervertebral space and directed towards the umbilicus. Free flow of C.S.F. is checked after the loss of the first resistance. Adequate amount of the drug is injected.

6. **Complications :**

   (a) ***Immediate*** :

   (i) Hypotension : mainly due to sympathetic blockade. Sympathetomimetic drug e.g. Mephentine is given intravenously.

   (ii) Cardio-respiratory failure (total spinal)

   — Intubation ventillation & resuscitation are required.

   (iii) Vomiting.

(b) ***Delayed :***

(i) Headache

(ii) Backache

(iii) Retention of urine

(iv) Cauda equina syndrome.

4. EPIDURAL ANAESTHESIA

1. Direct block of the spinal nerve roots in the epidural space.
2. **Technique :**
   (a) Hanging drop technique—drop sucked inside due to negative pressure.
   (b) Loss of resistance technique.
3. **Drug** : Lignocaine (1%)
   Bupivacaine (0.5%)
4. **Indications and Contraindications :** same as that of spinal anaesthesia.
5. **Advantages over Spinal anaesthesia**
   - Duration of action more.
   - Chances of C.S.F. contamination : absent.
   - Hypotension : less severe.
   - Headache : absent.
6. **Disadvantages :**
   - Backache—more severe
   - Anaesthesia—patchy : whereas in spinal
   - It is uniform.

6. POSTOPERATIVE COMPLICATIONS

Postoperative complications may be

1. **General :**
   (a) Respiratory
   - Atelectasis
   - Pneumonia
   - Pulmonary embolism (following D.V.T.).

(b) Cardiac — Myocardial infarction

(c) Thrombotic — Deep Venous thrombosis

— Thrombophlebitis.

(d) Urinary — Retention of urine

— Tubular necrosis (renal failure-anuria, oliguria).

— Urinary tract infection.

(e) Dehydration — Because of third-space sequestration of fluids in the operative site.

(f) Overhydration — In patients with impaired cardiac or renal function.

2. **Local :**

(a) Haemorrhage

(b) Wound infection

(c) Wound disruption (dehiscence)

(d) Other specific complications following the particular surgery.

Postoperative complications can also be grouped—

(a) **Immediate** : within first 24 hours.

(b) **Early** : upto 3 weeks postoperatively.

(c) **Late** : during any subsequent period after patient has left the hospital.

Postoperative complications following Abdominal surgery :

I. **General** — As mentioned above.

II. **Local** — Haemorrhage.

— Reactionary haemorrhage (within 6 to 24 hours).

— Paralytic ileus.

— Wound infections, including intrabdominal abscesses.

— Peritonitis.

— Secondary haemorrhage (7-14 days after operation).

- Wound disruption.
- Anastomotic leak (if anastomosis has been done).
- Intestinal obstruction (due to adhesions).
- Incisional hernia.
- Recurrence of the disease or symptoms.

7. ABSCESS DRAINAGE

The treatment of abscess is incision and drainage. In case of doubt it is safer to put in a needle and confirm the presence of pus by aspiration.

Hilton's method of drainage of Abscess :

Incision in the skin and deep fascia over the most prominent part.

A sinus forceps is thrust into the abscess cavity and its blades are opened to enlarge the opening.

A drain is put inside or the cavity is packed.

Dressing is changed on alternate days.

Parotid Abscess :

Vertical incision over the most prominent part. Cut skin and then incise the parotid fascia transversely to avoid injury to fascial nerve. Thrust in a sinus forceps. Put in a drain or pack.

Fluctuation may not be evident due to tense parotid fascia. If left untreated, it may burst open in the ear at the junction of bony and cartilagenous meatus.

Breast Abscess :

Radial incision to avoid injury to lactiferous ducts.

- Thrust the sinus forceps.
- Break all the loculi with finger.

- Pack with gauze soaked in E.C.
- See that the drainage is dependent.
- Counter drainage, if the abscess is situated in upper quadrant.

Ischio Rectal Abscess :

- Anaesthesia : General or Local (Pundendal block).
- Cruciate incision (+ shaped).
- Excise overhanging skin so that the wound becomes diamond shaped.
- Explore the cavity, break down any septa and remove the necrotic tissue.
- Pack the wound with E.C. guaze.
- Dressing daily or alternate days.
- Delay in opening ischio-rectal, abscess may result in fistula-in-ano.

8. VENESECTION (CUT DOWN)

Indications :

1. I. V. Infusion for longer periods.
2. In shocked patients (as in a case of Burn).
3. I. V. alimentation (feeding).

Veins :

- Antecubital fossa (basilic vein).
- Medial malleolus : long saphenous vein.

Procedure :

- Local anaesthesia, tourniquet.

1. Transverse incision over the vein.
2. Cut skin, clear superficial fascia.
3. Isolate the vein.
4. Pass two ligatures around the vein.

5. Distal one is tied.
6. Proximal one is half tied and its ends are kept loose.
7. A nick is made in the vein between the ligatures with scissors.
8. Canula or polythene tube is introduced upwards.
9. Proximal ligature is tied to enclose it.
10. Skin is stitched.

Complications : Thrombophlebitis
Thrombosis
Local infection.

9. SKIN GRAFTING

Indications : Extensive raw wound as a result of

(a) Deep burns
(b) Trauma
(c) Removal of malignant growth or callous ulcer.

Types of Skin Grafting :

A. FREE GRAFTS :

1. **Partial Thickness (Thiersch) Grafts** (10 to 30 mu in thickness) :

(a) Preparation of donor site (usually the anterior surface of the thigh & forearm).

– Shaving & cleaning with either soap or spirit, 24 hrs. prior to operation (Strong antiseptics are avoided).

– After anaesthesia, skin preparation & towelling. The skin must be put under strong tension either by assistant's open hand or by pressure with two wooden boards at the upper and lower ends of the donor area.

– The grafts are cut with a **Humby's** knife or dermatomes by a sawing motion.

– Detached grafts are spread over sofra tulle & are ready for transplantation to recipient area.

(b) Recipient area (wound) must consist of healthy granulation tissue with no exposed tendon or cortical bone or necrotic sloughs.

- Grafts are placed in the wound and spread out evenly. They should overlap each other as well as the margin of the wound.
- Then covered by sofra tulle & pads followed by pressure bandage.
- Dressing is changed after 7 to 8 days. It must be soaked with saline before removal from the wound.

2. **Full Thickness (Wolfe) Grafts :** These grafts are better than the thiersch grafts in that they have no tendency to contract and are of better colour and are ideal for the **face** or **palm**. The survival of the grafts depends on early vascularisation as opposed to partial thickness grafts which may live on exudate (lymph) for the time being.

3. **Pinch or Reverdin Graft :** These are small (1/4 inch) cones of skin consisting of whole thickness at the central part & epidermis at the periphery.

B. PEDICLE GRAFT :

These grafts are suitable for the hand and foot and to repair deep defects in the face.

1. **Rotational Flaps :** The flap is made from the neighbourhood of the wound and is turned or rotated on their own blood supply to cover the defect.

2. **Direct Pedicle Grafts** : This method is applicable when the donor area can be brought into close proximity with the recipient area.

3. **Tubed Grafts** (Indirect pedicle grafts) : It is indicated in those cases where the donor and the recipient area cannot be brought close to each other. It is done in stages. For example, tubed graft constructed from the abdomen is first attached to forearm and then it is finally put on the face.

C. MICROVASCULAR FREE PEDICLE GRAFT.

10. CIRCUMCISION

Indications :

1. For religious custom.
2. Phimosis.
3. Recurrent attacks of paraphimosis.
4. Recurrent attacks of balano-posthitis.

Anaesthesia :

General or Local.

Circumcision in Adult :

1. Separate the adhesions, if any, in between the prepuce and glans with the help of a probe or artery forceps.
2. Hold the margin of the prepuce in Allis/artery forceps.
3. Slit the prepuce in the mid-dorsal line beyond the middle of the glans.
4. Remove smegma.
5. Cut away the redundant parts of both prepucial layers in a line parallel to the corona (more of the inner layer being removed).
6. Catch the frenular artery; in the midline ventrally and secure it in 3 in 1 stitch (Ligate it).
7. Ligate any other bleeding vessels.
8. Suture two layers of the prepucial skin by interrupted sutures (usually by Catgut).
9. Apply dressing (gauze) with ointment or tincture benzoin.

Circumcision in Child :

As the prepuce is long, an artery forceps is placed (clamped) across it just beyond the tip of the glans in an oblique line parallel to the corona. The prepuce beyond is cut off close to the clamp. The clamp is then removed. Other stages are the same as mentioned above.

The frenular artery must be adequately secured (tied), as sometimes it may cause troublesome bleeding. Contraindication of circumcision is hypospadius.

11. VASECTOMY

Indications :

1. To effect sterilisation.
2. In association with prostatectomy to avoid epididymitis.

Anaesthesia : Local.

Procedure :

1. Palpate the vas at the postero-lateral aspect of scrotum or near the root of penis (feels like cord).
2. Fix it with thumb and fingers.
3. Infiltrate L.A.
4. Transverse incision-about $\frac{1}{2}$ to 1 inch.
5. Cut the layers-blunt dissection.
6. Catch the vas with Allis' forceps.
7. Separate it from its coverings.
8. Divide between clamped forceps (a small portion may be removed).
9. Ligate the ends with silk.
10. Close the wound.

Complications : Haematoma

Infection.

F.B. granuloma (or sperm granuloma).

HYDEROCELE

Layers of Scrotum :

Skin, dartos, external spermatic fascia, cremasteric muscle

and fascia, internal spermatic fascia, parietal layer of tunica vaginalis.

Indications :

Hydrocele, pyocele, haematocele.

Anaesthesia : General or Local.

Local anaesthesia usually preferred.

Procedure :

1. Cord block is done by injecting about 2 to 3 cc of 1% Xylocaine in the cord.
2. Assistant makes the hydrocele tense.
3. Infiltrate L. A. through all the layers.
4. Incision : Transverse/oblique in between the lines of scrotal blood vessels (veins) through all layers.
5. Dissect and deliver the hydrocele.
6. Open the sac, drain the fluid, avoid injury to testis.
7. **Evert the sac.**
8. Suture the cut edge of tunica for haemostasis with catgut so that the sac remains everted. A few sutures may be necessary to retain it in position.

   (If large or thickened, part of tunica vaginalis should be excised and the remainder everted and sutured behind the testis).
9. The margins of the sac should not be too tight around the cord (to avoid strangulation).
10. Secure haemostasis.
11. Close the wound.

Sometimes corrugated drain may be put in to avoid haematoma formation.

Complications :

Haematoma

Wound infection

Wound disruption.

12. INGUINAL HERNIA

ANATOMY :

Length of inguinal canal is $1\frac{1}{2}$", ext. inguinal ring lies just above the pubic tubercle.

Deep inguinal ring : lies $\frac{1}{2}$" above the mid inguinal point.

Boundary :

Anterior : External oblique

Internal oblique in the lateral third.

Posterior : Transversalis fascia

Conjoint tendon medially.

Roof : Arched fibres of int. oblique.

Floor : Inguinal ligament.

Hesselbach's Triangle :

Bounded medially by the rectus, laterally by the inferior epigastric vessels and below by the inguinal ligament.

Coverings :

Indirect inguinal hernia : Skin, Sup. fascia, ext. spermatic fascia, cremasteric muscle & fascia, int. spermatic fascia.

Direct inguinal hernia : Skin, superficial fascia, ext. spermatic fascia, conjoint tendon or its prolongation, transversalis fascia.

Under 3 years of age, both rings, lie superimposed.

DEFINITIONS :

I. **Herniotomy :** (Excision of the sac) :

Infant & children upto 14 years.

II. **Herniorrhaphy** : Young adult

Excision of sac + repair of post. wall by absorbable or non-absorbable suture material e.g. catgut, thread, **prolene**, silk.

III. **Hernioplasty :**

Excision of sac + repair of post. wall by living material e.g. Ext. oblique aponeurosis, fascia lata, skin ribbon.

OPERATIVE PROCEDURE :

The essentials of hernia repair are :

(a) Excision of sac (herniotomy) :

(b) **Repair of posterior wall e.g. Conjoint tendon-Inguinal Ligament apposition (C.I.A.).**

Steps of operation :

1. Inguinal incision about 1" above and parallel to medial 2/3 of inguinal ligament.
2. Cut skin & superficial fascia.
3. Cut ext. oblique-open superficial inguinal ring.
4. Raise the leaves of ext. oblique to define conjoint tendon medially and inguinal ligament laterally.
5. Visualise the Sac lying anterior to the cord, covered by cremasteric muscle & fascia.
6. Incise the coverings longitudinally define the sac as a **pearly white structure**, dissect and separate the sac from cord upto the neck.
7. Define the neck by finding **extraperitoneal fat** and inf. epigastric artery.
8. Transfix and ligate the neck, excise excess portion (Herniotomy).
9. Lift the cord on the sling.
10. Repair (stitch the conjoint tendon to the inguinal ligament) with a strip of ext. oblique aponeurosis **(hernioplasty)** or **prolene** or by simple interrupted suture **(Bassini's repair)**.

— The most medial suture should include the periosterum of the pubic tubercle. While applying the suture, the bite on the inguinal ligament should be superficial so that the femoral vein is not punctured.

— Some Surgeons prefer to do **lytle's repair** (narrowing the

internal ring with lateral displacement of cord) specially of transversalis fascia (plication).

- **Shouldice repair** consist of double breasting of transversalis fascia.
- **Tanner slide** operation consists of relaxing incision of the rectus sheath, after the repair of posterior wall.

DIRECT INGUINAL HERNIA :

Steps of operation are the same as those of an indirect hernia. In direct hernia, the sac is dissected free from the surrounding structures & inverted into the abdomen by plication. Care is taken **not to injure urinary bladder.**

Sometimes if it is wide necked one, it is better to cut away the redundant portion & repair the sac (peritoneum) by continuous suture.

This is followed by repair as described for indirect hernia.

SLIDING HERNIA (Hernie-en-Glissade) :

Steps of operation is the same as that of indirect hernia but **no attempt should** be made to dissect the caecum, sigmoid or urinary bladder (forming the posterior wall of the sac) free from the peritoneum otherwise the blood supply will be imperilled. And it may lead to peritonitis or fistula. Only the free portion of the sac below the attached viscous is removed and the sac (peritoneum) is repaired by continuous suture and the whole mass is returned to the abdomen.

ORCHIDECTOMY IN HERNIA OPERATION :

Orchidectomy should be considered while repairing hernia in elderly patients, recurrent hernia, sliding hernia or a very big hernia with very weak abdominal musculature.

COMPLICATIONS OF HERNIA OPERATION :

On the table :

(a) Division of vas

(b) Injury to deep epigastric vessels or

(c) Injury to External iliac vessels.

Post operative : Haematoma, wound infection & recurrence.

13. STRANGULATED INGUINAL HERNIA

Emergency Operation : Ryle's tube aspiration, intravenous fluids & antibiotics are absolutely essential.

Procedure : Preferably general anaesthesia.

1. Inguinal incison extending over the most prominent part of swelling.

2. Cut skin, superficial fascia, define External oblique aponeurosis & the sac with coverings.

3. Incise the coverings of the anterior surface of sac.

4. **Incise the sac & drain out the toxic infected** fluid.

5. Cut the constriction band & external oblique. Constriction band, in order of frequency, is located (a) At the superficial inguinal ring (b) In the inguinal canal (c) At the deep inguinal ring. At or near the deep ring the band should be incised parallel to the deep epigastric vessels i.e. upwards & medially.

6. Examine carefully the contents of the sac. Excise devitalised omentum after ligation (transfixation).

7. If the loop of gut is viable, return it to the abdomen. Separate the sac from its coverings.

8. Ligate (transfix) the neck of the sac—**Herniotomy.**

9. If the condition of the patient permits, repair the posterior wall as usual—Herniorrhaphy or Hernioplasty.

— In doubtful cases warm moist abdominal pack should be applied many a times for atleast ten minutes to see if signs of viability set in.

— **Differentiation between Viable & Non-Viable loop :**

Viable	Non-Viable
(a) Dark colour becomes lighter.	(a) Greenish or blackish in colour.
(b) Presence of pulsation in the mesentery.	(b) Pulsation absent.
(c) Presence of peristalsis in the loop.	(c) Peristalsis absent.
(d) Peritoneum shiny.	(d) Peritoneum dull and lustreless.

If the loop of the bowel is non-viable (gangrenous), Resection & anastomosis has to be performed.

INTESTINAL RESECTION AND ANASTOMOSIS

Common indications :

1. Gangrene of a loop of bowel.
2. Trauma (irreparable injury).
3. Stricture e.g. Tuberculous.
4. Tumour—usually malignant tumour.

Anastomosis between the two ends is done in two layers.

(a) Ist layer consisting of whole thickness.

(b) 2nd layer consisting of seromuscular suture.

After anastomosis, mesentery of the two anastomosed ends are approximated.

Different methods :

(a) End to end (b) Side to side e.g. in Iliotransverse colostomy (e) End to side.

14. FEMORAL HERNIA

Surgical Anatomy :

The femoral canal occupies the most medial compartment of the femoral sheath. It is about 1.25 cm long & 1.25 cm wide at the femoral ring. It contains fat, lymphatic vessels, and the gland of cloquet.

Boundaries of Femoral Ring :

Anterior : Inguinal (poupart's) ligament.

Posterior : Cooper's (pectineal) ligament.

Medial : Gimbernat's ligament.

Lateral : Septum separating it from the femoral vein.

Procedure :

- Femoral hernias are very susceptible to strangulation because of the unyielding margins of the femoral ring e.g. knife like edge of Gimbernat's ligament.
- The essential part of repair of femoral hernia is obliteration of the femoral ring area by (a) apposition of conjoint tendon to cooper's ligament (**C to C**) (b) apposition of pectineal ligament to poupart's ligament (**P to P**), by non-absorbable suture material (silk).

(a) **Low Operation (Lookwood's) :** A groin crease incision is made. After dealing with the sac, inguinal (poupart's) ligament is approximated to cooper's (pectineal) ligament, so as to obliterate the femoral ring.

(b) **Inguinal Operation (Lotheissen's) :** Inguinal canal is opened. Transversalis fascia is incised and the sac is defined, withdrawn & transfixed. Repair is done by approximating conjoint tendon to cooper's ligament.

(c) **High (Mc Evedy's) Operation :** A vertical incision is made over the femoral canal and extended upwards above the inguinal ligament. Anterior rectus sheath is incised vertically in its lowest part (medial to its lateral border). Rectus is retracted medially. Extraperitoneal space is cleared, sac is identified & withdrawn from the femoral canal & dealt. Repair is completed by apposing conjoint tendon to cooper's ligament.

- For strangulated femoral hernia, Mc Evedy's operation is preferable.
- During repair of femoral hernia, care **must** be taken to protect external iliac/femoral vein on lateral side & urinary bladder on the medial side.

15. UMBILICAL HERNIA

I. Umbilical Hernia of Infants and Children :

- The vast majority close spontaneously during the first year of

life. Strapping after putting a big coin or application of a rubber umbilical pad may encourage this process.

– Where the hernia fails to disappear after the age of 2 years, operation is advised. Excision of the sac should be done through a semi circular subumbilical incision preserving the umbilicus, and the edges of the defect closed.

II. Para Umbilical Hernia of Adults :

Mayo's operation : Through a transverse elliptical incision umbilicus & hernial sac are excised. Rectus sheath is incised transversely on each side. Repair is done by overlapping (double-bracing) the edges of the rectus sheath above and below the hernia.

16. APPENDICECTOMY

Surgical Anatomy : 6 to 10 cms in length.

Position :	Retrocaecal	74%
	Pelvic	21%
	Paracaecal	2%
	Subcaecal	1.5%
	Pre-ileal	1%
	Post-ileal	0.5%

Appendicular artery : A branch of ileo colic artery.

Mesoappendix : Usually distal one third of appendix is devoid of meso-appendix.

Appendicular artery lies in its free border.

Mc Burney's point : Junction of lateral third & medial 2/3 of the line joining the ant. sup. iliac spine and umbilicus.

Indications for Operation :

(i) **Acute appendicitis :** Before formation of lump i.e. before 48 hours.

(ii) **Interval appendicectomy :** Recurrent appendicitis.

Procedure :

1. **Incision : Gridiron Incision** (about 2 to 3 inches) is made with its centre over Mc Burney's point, at right angles to a line joining the anterior superior iliac spine to the umbilicus.
2. Cut skin, superficial fascia (two layers, fatty & membranous). Cut Ext. oblique aponeurosis in the same line.
3. Split fibres of int. oblique and tranversus. Apply retractors in the corners.
4. Lift the peritoneum with Allis' forceps, open the peritoneum.
5. Search for the caecum and appendix (follow taenia coli—to appendix).
6. Deliver caecum and appendix in the wound (catch the appendix with Allis' or Babcock's forceps).
7. Define mesoappendix, ligate & cut close to the appendicular attachment (Secure appendicular vessels).
8. Purse string suture (seromuscular) around the base in the caecum (with intestinal catgut).
9. Crush and ligate the base of appendix with thread (artery forceps holding the thread just adjacent to the knot). Remove the appendix.
10. Touch the stump with a swab (soaked in antiseptic solution).
11. Invaginate and tie the purse string suture. Inspect terminal ileum for any other pathology, look for haemostasis.
12. **Closure** : Close Peritoneum. Oppose split fibres of internal oblique & transversus. Suture ext. oblique aponeurosis. Suture Skin.

Other Incisions :

1. Right paramedian.
2. Rutherford Morrison (muscle cutting).
3. Lanz incision : Transverse in the inter spinous groove.

Some Important Considerations :

1. In case of difficulty in tracing the appendix : Try to deliver the caecum & follow taenia coli. Enlarge incision by cutting the int. & transversus muscle.
2. If the base of the appendix is gangrenous : No purse string suture should be applied.
   - Remove the appendix flush with the caecal wall.
   - Close the defect in two layers.
3. Incidentally if it is a case of tuberculosis or Crohn's disease. Appendicectomy should be avoided for the fear of fistula formation.
4. In case of difficulty in finding the tip.
   - Retrograde appendicectomy : deal the base first, invaginate and then remove the mesoappendix bit by bit till you reach the tip.
5. A drainage tube may be put in, in a case of ruptured appendix.

Post-Operative Complications :

1. Ileus.
2. Wound infection.
3. Residual abscess.
4. Faecal fistula.
5. Int. obstruction.
6. Pyelephlebitis.
7. Pulmonary complications.
8. Incisional hernia.

17. ABDOMINAL INCISIONS

1. Paramedian : Right / Left. | Upper / Middle / Lower

2. Midline : Upper
   Lower
3. Subcostal : Right (Kocher's)
   Left.
4. Grid-iron incision
5. Lanz incison
6. Battle incision (Para rectal).
7. Rutherford Morrison (Muscle cutting iliac incision).

PARAMEDIAN INCISION

Upper : above umbilicus

Middle.

Lower : below umbilicus.

It is the most widely used incision.

Procedure :

1. Incision : Parallel to midline about 1" lateral to it.
2. Cut skin, superficial fascia.
3. Incise anterior rectus sheath in the line of skin incision.
4. Apply forceps on the medial cut edge of the rectus sheath.
5. Separate rectus muscle from the medial leaf and retract it laterally.
   - Three tendinous intersections : one at the level of umbilicus, one near Xiphisternum and one is between them. Tendinous intersections are not attached to the posterior sheath.
   - Nerve supply to rectus comes from lateral side.
6. Lift the posterior sheath, alongwith peritoneum and incise in the line of skin incision.

Closure : In three layers.

1st layer : Peritoneum and post. sheath.

2nd layer : Ant. rectus sheath.

3rd layer : Skin.

18. OPERATION FOR PEPTIC ULCER

Blood supply of stomach :

1. Left gastric : from coeliac axis artery.
2. Right gastric : from hepatic artery.
3. Right gastroepiploic artery : from gastroduodenal artery.
4. Left gastroepiploic artery : from splenic artery.
5. Short gastric arteries from splenic artery.

Operations :

GASTRIC ULCER : Partial gastrectomy

1. Billroth I-where gastroduodenal continuity is maintained.
2. Polya gastrectomy : Duodenal stump is closed, and the gastric remnant is anastomosed to the 1st loop jejunum.

DUODENAL ULCER :

1. Vagotomy + pyloroplasty.
2. Vagotomy + gastrojejunostomy.
3. Vagotomy + antrectomy
4. Polya gastrectomy.
5. Selective vagotomy plus drainage procedure.

5. Ligate & divide ileocolic and right colic vessels (The right branch of the middle colic artery is ligated and divided if an extensive resection is required for malignant disease, but often this vessel may be preserved).
6. Separate the greater omentum from the transverse colon upto and a few centimetres beyond the point of division of the transverse colon.
7. Divide the transverse colon & the ileum between clamps. Clean the cut ends with swabs.
   (Ileum is divided obliquely making the antemesenteric border shorter than the mesentric border to obtain extra width).
8. Check for the vascularity (Cut ends of intestines should bleed freely after releasing the intestinal clamps).
9. Perform anastomosis in two layers (a) **First layer**—all coat sutures using continuous 1/0 or 2/0 atraumatic catgut. (b) **2nd layer**—Seromuscular interrupted sutures using atraumatic 2/0 thread or silk.
10. Close the mesenteric gap carefully, using interrupted 2/0 atraumatic thread/catgut sutures.
11. Closures of abdomen in layers.

Complications :

Besides general complications, specific complications include primary and reactionary haemorrhage, wound infection, wound disruption, ileus and **anastomotic leakage** with subsequent peritonitis.

20. COLOSTOMY

Colostomy is an artificial opening made into the colon in order to divert faeces and flatus to the exterior.

I. A colostomy may be

1. **Temporary :** e.g. in cases of acute obstruction.
2. **Permanent :** e.g. after abdominoperineal excision, Excision of carcinoma of rectum and anal canal.

II. Depending upon the site, a colostomy may be

(a) **Pelvic colostomy**

(b) **Transverse colostomy.**

III. Colostomy may be

1. **Terminal colostomy :** Bringing out the terminal end of colon on the abdomen, as in cases of carcinoma rectum. There is a single stoma. Distance of the stoma from the anterior superior iliac spine should be atleast 2.5 cms.
2. **Loop colostomy :** Bringing out a loop of colon on the abdominal surface & opening it. There is a double stoma.
3. **Devine defunctioning colostomy :** Colon is divided so that both ends can be brought separately to the surface. There should be a distance of two inches between the two cut ends of the colon.

Indications :

1. **Congenital :** (a) High imperforate anus.
   (b) Rectovaginal or rectovesical fistula.
2. **Traumatic :** Injuries of rectum or colon.
3. **Inflamatory :** Multiple fistula-in-ano.
4. **Neoplastic :** (a) Following resection of rectum and anal canal (operable or inoperable).
   (b) Preparatory procedure prior to resection of left colon or rectum.

Complications of colostomy include—Retraction, prolapse, stenosis, incisional hernia, sloughing, lateral space obstruction (due to failure to obliterate the lateral space between the colon & parietal wall) and Perforation (from an enema tube).

21. CHOLECYSTECTOMY

Surgical anatomy : G.B.—7.5 to 12.5 cms long (3"—5").
Cystic duct— 2.5 cms (1")
CBD— 7.5 cms (3")
CHD— 2.5 cms (1")

Parts : Fundus, body, neck, angulated distal part : Hartman's pouch and cystic duct.

Arterial supply : Cystic artery, a branch from right hepatic artery usually passing above and behind the cystic duct.

CBD :

- Supra duodenal, retroduodenal, infraduodenal and intra-duodenal portion.
- Junction of cystic and common hepatic duct-T junction.
- There may be various types of congenital anomalies of gall bladder cystic duct and cystic artery.
- Calot's triangle is bounded above by the liver, medially by the common hepatic duct and below by the cystic duct.

Indications : Acute cholecystitis is treated on conservative lines except when perforated or gangrenous.

1. Chronic cholecystitis
2. Cholelithiasis
3. Mucocele
4. Empyema
5. Carcinoma (operable)
6. Acute chlecystitis : perforation gangrene
7. Cholecystoses.

Incision : Upper (R) paramedian
Transverse incision
Subcostal (Kocher's) incision.

Procedure :

1. Confirm the diagnosis
2. Isolate the area, one pack over the transverse colon and duodenum, another pack over the stomach.
3. Catch the fundus with a long haemostat or cholecystectomy clamp-acting as retractor.
4. Dissect and define the cystic duct and T junction, usually by blunt dissection with cholecystectomy clamp.
5. Catch the Hartman's pouch with another pair of haemostat.

6. Pass ligature around the cystic duct, tie and divide it in between the clamps and ligated end. Take care to leave considerable amount of cystic duct stump so that the ligature may not slip out.
7. Define cystic artery, divide it between ligature and clamp.
8. Beware of any accessory artery, any congenital anomaly and about bleeding.
9. Separate gall bladder from the liver bed by cutting the leaves of peritoneum on either side of gall bladder.
10. In the end leave the separated gall bladder to act as retractor.
11. Peritoncalise the raw area of liver by stitching the cut edges of peritoneum.
12. Remove the gall bladder.
13. Put in a drianage tube through a separate stab wound in the right flank.
14. Close the abdomen.

Indications for exploration of Common Bile Duct :

1. Jaundice or history of jaundice.
2. Stone in C.B.D.
3. Dilated C.B.D. (more than 10 mms).
4. Gall bladder filled with small multiple stones.
5. Single faceted stone in the gall bladder.
6. Wall of C.B.D. enormously thickened.
7. Negative shadow in operative cholangiography.

22.CHOLEDOCHOLITHOTOMY (Supraduodenal)

Preoperative preparation :

1. Plenty of intravenous **Dextrose** (10%) : to make good the liver insufficiency (3-4 days prior to surgery).
2. **Vit. K** (parenteral) daily at least 3-4 days prior to surgery for maintaining normal prothrombin level in the blood.

3. Correction of anaemia.
4. Antibiotics to control the biliary infection.

Procedure :

1. Identify CBD at the right free margin of epiploic foramen (Foramen of Winslow). In cases of doubt, **aspirate** bile by means of fine needle.
2. Apply two stay sutures on the CBD in vertical axis.
3. Incise CBD in between the sutures, milk out stone/stones through the choledochotomy incision or remove the stone by **Desjardins** forceps, malleable scoop or with the help of Fogarty catheter.
4. Pass urethral bougie of suitable size upwards and also downwards till tip is felt inside the second part of duodenum.
5. Flush out any possible debris or gravels by saline water through a catheter.
6. **Introduce T-tube** of suitable size (after testing its patency & cutting the excess portions of transverse limb) into the duct. Suture the excess of the opening, in the duct by the side of the T-tube.

   T-tube is usually removed in about 7-10 days time, provided intermittent & continuous clamping does not produce pain or leakage of bile around the tube, colour of stool should be of normal colour (not pale or white). T-tube cholangiogram must show free passage of dye into the duodenum without any negative shadow.

Post operative complications include :

Haemorrhage, injury to CBD, or duodenum, ileus, peritonitis, pancreatitis, pyelephlebitis, wound infection, biliary fistula etc.

23. SPLENECTOMY

Indications :

1. Trauma (Rupture)
2. Cyst of spleen

3. Acholuric jaundice
4. Hodgkin's disease (staging)
5. Preparation for Lieno renal anastomosis
6. Thrombocytopenic purpura
7. Tumour
8. Thallassemia
9. Torsion.

Anaesthesia : General.

Position : Supine.

Procedure :

Mobilize and rotate the spleen medially in the wound. Separate vascular adhesions, if any. Incise lateral peritoneum to expose lieno-renal ligament. Separate the tail of pancreas. Divide and transfix the lieno-renal pedicle.

Deal with the gastrosplenic ligament.

For non-traumatic cases :

First deal with gastrosplenic ligament. Then the vessels in the lieno-renal ligament are dissected out, ligated and divided.

A drainage tube is put in.

Complications :

I. General : cardiac, pulmonary or thrombotic.
II. Injury to the tail of pancreas, fundus, haemorrhage.
III. Sepsis, wound disruption, peritonitis.
IV. Abdominal pain with fever, thrombosis of portal vein.
V. Postsplenectomy septicaemia—mainly due to meningococcal.

24. LUMBAR SYMPATHECTOMY

The main aim of the lumbar sympathectomy should be to improve the blood flow to the skin vessels by protecting them against arteriospasm. However the **indications** are :

1. Hyperhidrosis.
2. Certain types of obscure pain such as causalgia.
3. Vasospastic conditions.
4. Buerger's disease and other peripheral arteritis.
5. To improve skin nutrition (healing of ischaemic ulcers).
6. In conjunction with direct arterial surgery, if the run off is poor.
7. To lower the level of amputation.

Anaesthesia : General.

Position : Semiprone.

Incision :

Transverse or oblique loin incision (from a point below the tip of 12th rib to the border of rectus).

Procedure :

Cut skin, sup. fascia, ext. & int. oblique and transversus.

1. Take care not to open the peritoneum.
2. Strip the peritoneum medially so as to expose the inner border of the psoas muscle (ureter and genital vessels being raised with it).
3. Search for the sympathetic chain lying in the groove between the vertebral bodies and the psoas muscle, overlapped by the vena cava on the right side and aorta on the left side.
4. Divide (or avulse) the sympathetic trunk and remove 2nd, 3rd & 4th ganglia.

   (1st ganglion lies under the crus of the diaphragm, bilateral removal will lead to impotency).
5. Avoid injury (tearing off) of lumbar veins.
   Care should be taken not to mistake lymph nodes, genitofemoral nerve and psoas minor muscle (if present) for the sympathetic chain.
6. **Closure** : Muscles in two layers.

   Followed by suture of the skin.

25. HAEMORRHOIDECTOMY

Treatment of HAEMORRHOIDS :

1. Injection — 1st degree & early 2nd degree | haemorrhoids
   — 5% Phenol in almond oil (by Gabriel's syringe 3-5 mls).
2. Anal stretching (Lord's procedure).
3. Banding treatment (for 2nd degree) by Baron's Bands.
4. Cryo surgery.

Indications of HAEMORRHOIDECTOMY :

1. 3rd degree haemorrhoids.
2. Late 2nd degree haemorrhoids.
3. Fibrosed haemorrhoids.
4. Intero external haemorrhoids when the external haemorrhoid is well defined.

HAEMORRHOIDECTOMY :

Preparation :

(a) Laxative 36 to 48 hours before operation.

(b) Liquid or non residue diet.

(c) Enema & bowel wash on the evening before operation or early in the morning.

(d) Intestinal antiseptic may be given for 48 hours prior to surgery, e.g. Neomycin, Tinidazole.

Anaesthesia : General

Spinal.

Position : Lithotomy.

Procedure :

1. Anal stretching is done.

2. Pick up each haemorrhoid mass with artery forceps, hold the external haemorrhoid or the skin tag with another artery forceps.
3. V shaped incision in the skin at the muco cutaneous junction with a pair of scissors. First deal 3^{o} clock haemorrhoid.
4. Dissect the pile mass, separate the internal sphincter by blunt dissection and open the submucous space.
5. Transfix the pedicle with thread or catgut.
6. Excise the pile mass 1.25 cms distal to the ligature.
7. Deal 7 and 11^{o} clock haemorrhoids in similar manner (must leave a bridge of skin in between the excised haemorrhoids).
8. Secure haemostasis.
9. Pack the wound with or without rectal tube.

Complications :

(a) Retention of urine
(b) Reactionary haemorrhage
(c) Secondary haemorrhage
(d) Anal stricture.

26. SUPRAPUBIC CYSTOSTOMY

Indications :

1. Drainage of bladder—Retention of Urine, acute or chronic.
2. For treating intra vesical pathology e.g. stone—**suprapubic cystolithotomy**, growth, diverticula.
3. For transvesical (Freyer's) prostatectomy.

Steps :

1. Incision : Lower midline or tranverse just above pubis.
2. Out skin, subcutaneous tissue and
3. Linea alba (Ant. rectus sheath).

4. Separate Rectus muscles & Pyramidalis to expose transversalis fascia. Posterior rectus sheath is deficient.
5. Overlying peritoneum with the extraperitoneal fat is stripped upwards.
6. Recognise bladder – by veins
   – musculature - criscross
   – Aspiration with syringe & needle (aspirate urine).
7. Stay sutures.
8. Open the bladder.
9. See and palpate inside.
   Remove stone if any, (by sponge holder).
   Put in a **malecot** or Depezzer catheter.
10. Stitch bladder with catgut.
11. Put in a corrugated drain in the cave of retzius.
12. Stitch linea alba & skin.

27. PROSTATECTOMY

1. Transvesical (Freyer's)
   – One stage
   – 2 stage procedure when the renal function is poor or suprapubic cystostomy has been done for acute retention.
   1st stage : suprapubic
   2nd stage : removal of prostatic adenoma.
2. Retropubic (Millin's).
3. Perineal (Young's).
4. Transurethral prostate resection T.U.R. :
   Main indications are
   (a) Fibrous
   (b) Carcinoma of prostate
   (c) Isolated middle lobe enlargement.

Indications for Prostatectomy :

1. **Prostatism :** Considerable frequency day & night, poor stream.
2. **Acute retention** of urine which is unrelieved by passing a catheter, emptying the bladder and immediately removing it.
3. **Chronic retention :** Residual urine of 200 mls or more.
4. **Haemorrhage :** Haematuria due to ruptured veins overlying the prostate—only indication of emergency prostatectomy.

Investigations :

1. Routine investigations, urine culture & sensitivity.
2. Blood urea & creatinine.
3. I.V.P. & post micturition cystogram.
4. Serum acid phosphatase (Normal 1 to 3 king Armstrong units).
5. Ultrasonogram (Transrectal).
6. Cystoscopy : if Millin's prostatectomy is planned.
7. P.S.A. (Prostate specific antigen).

28. EXPOSURE OF THE KIDNEY

Surgical approach to the kidney may be—

1. Lumbar approach (Sub costal).
2. Through the bed of the 12th rib (Transcostal).
3. Throraco abdominal approach (Through the bed of the 10th rib).
4. Transperitoneal approach.

Lumbar approach is most commonly employed. It is entirely extraperitoneal. The transperitoneal approach should be preferred in the case of renal tumours, as the pedicle can be dealt with, before the kidney is manipulated and the risk of spread of malignant cells is reduced.

Lumbar approach (Morris) :

Anaesthesia : General, preferably with relaxant.

Position : Lateral kidney position.

The patient is placed on his sound side. The hip & knee next to the table are fully flexed. The kidney bridge is raised so as to flex the trunk laterally and increase the space available for access. The patient is secured in this position to avoid rolling on either side by a broad band of adhesive strapping and sand bags.

Incision : Lumbar incision.

It begins just above the angle between the 12th rib and the erector spinae and extends downward and forwards and terminates about 2" above the anterior superior iliac spine. If necessary, it may be prolonged as far as the lateral border of rectus muscle.

Procedure :

1. Cut skin and superficial fascia.
2. Cut Lattissimus dorsi (posteriorly) and ext. oblique (anteriorly).
3. Cut Serratus posterior inferior in the posterior corner and internal oblique anteriorly (Try to save the subcostal nerve and vessels lying deep or just over the transversus).
4. Incise Lumbar fascia, push the peritoneum forwards while separating (or cutting) the fibres of transversus.
5. Lift the renal fascia, well behind the peritoneum with haemostats and incise.
6. Separate the fatty capsule (peri-renal fat) from the kidney with the fingers. Define the upper and lower poles.
7. After mobilisation, deliver the kidney into the wound.
8. **Closure :** Muscles are stitched in two layers. It is followed by skin suture with or without a drain.

(A) **Nephrectomy :**

1. Renal tumours (malignant), tumours of renal pelvis will need nephroureterectomy.

2. Pyonephrosis
3. Renal tuberculosis (nephroureterectomy)
4. Hydronephrosis

where there is massive destruction of parenchyma and the kidney is function-less. The other kidney must be functioning.

5. Trauma : grossly lacerated with profuse haemorrhage, threatening life.

— The pedicle of the kidney is defined and dealt either by mass ligation or individual ligation. The kidney pedicle clamp may be necessary.

(B) **Pyelolithotomy :**

The kidney is drawn well forward over the wound margin so that its posterior surface is exposed. The pelvis is cleared of fat by gauze stripping. Stone/stones are palpated and steadied. Incision is made in the posterior wall of the pelvis directly over the stone and radiating towards the pelvi-ureteric junction. Stone is removed by forceps or scoop.

After completion of the procedures (irrigation of pelvis and passage of a bougie down the ureter), the incision in the pelvic wall is repaired with interrupted sutures of the fine catgut.

(C) **Neophrolithotomy :**

It is indicated when there has been previous surgery, with adhesions making approach to the pelvis difficult. The incision is made just behind and parallel to the most prominent part of the convex border of the kidney (Brodel's line).

Thermocouple regulated cooling may be required to enable the renal pedicle to be clamped.

Pyelolithotomy may be combined with Nephrolithotomy (Pyelonephrolithotomy).

29. EXPOSURE OF THE URETER AND URETEROLITHOTOMY

Indications :

(a) The stone when first seen is too large to pass naturally.

(b) Gross evidence or obstruction is present or a hydronephrosis increasing.

(c) Repeated attacks of colic produce no advance of the stone.

(d) The stone is enlarging but not moving.

(e) The urine is intected.

It is a wise precaution to carry out X-ray examination immediately prior to operation.

I. STONE IMPACTED IN THE UPPER THIRD OF THE URETER :

The incision is similar to that for exposing the kidney.

II. STONE IMPACTED IN THE LOWER TWO THIRDS OF THE URETER, but above the ischical spine.

Position : Supine or semi recumbent with sand bags below the shoulder and buttock of the affected side.

Incision : Muscle cutting iliac incision (Rutherford Morrison).

Procedure :

1. Cut skin, superficial fascia, ext. & int. oblique and transversus muscles in the same line.
2. Peritoneum is swept forwards and medially of the fascia covering the iliacus and retracted medially until the ureter is exposed.
3. Identify the ureter, crossing the bifurcation of common iliac vessels. More commonly it is found to have been elevated alongwith the peritoneum.
4. Pass a tape around the ureter, after mobilisation.
5. Palpate the stone, steady between finger and thumb (stone may be milked upwards or downwards to a convenient point for extraction).
6. Incise the ureter longitudinally over the stone.
7. Remove the stone with forceps or scoop.
8. Close the incision in the ureter with fine plain catgut suture passing through the muscular coat only.
9. Close the wound in layers with a drainage tube.

III. STONE IMPACTED IN THE JUXTAVESICAL OR INTRA-MURAL PORTIONS OF THE URETER :

Position : Supine, preferably in trendelenburg's position.

Incision : Sub-umbilical midline incision.

Procedure :

1. After cutting the skin, linea alba etc.
   Peritoneum is stripped from the dome of the bladder & from the side wall of pelvis.
2. Blunt dissection between the posterior surface of the bladder and the wall of the pelvis.
3. Try to palpate the stone.
   (In case of difficulty the ureter should be defined where it crosses the iliac vessels, and traced downwards. At times, bladder should be opened, ureteric orifice defined and ureteric catheter may have to be passed).
4. Remove the stone as described above.
5. Closure in layers with a drain.

30. MASTECTOMY

ANATOMY :

Surgical anatomy : The breast extends from 2nd to 6th rib & from sternum to anterior axillary line.

The ligaments of cooper conical projections of fibrous tissue, filled with breast tissues, apices of which is attached to the deeper layer of skin.

Areola contains : (a) sweat glands (b) sebaceous glands (glands of Montogomery) and (c) accessory mammary glands.

Arterial supply :

1. Branches from lateral thoracic (branch of axillary artery).
2. Internal mammary (perforating branches).
3. Branches from intercostal arteries.

Lymphatics :

1. **Anterior** (Pectoral) : lying deep to pectoralis major.
2. **Posterior** (Subscapular) : along subscapular vessels.
3. **Lateral** (Brachial) : along the axillary vein.
4. **Central :** within the axillary fat.
5. **Apical :** at the apex of axillary, immediately behind the clavicle.
6. **Internal mammary group** (mainly from the medial half of the breast) : along the internal mammary vessels.

SIMPLE MASTECTOMY

Indications :

- Carcinoma Breast, specially stage III & IV and sometimes in stage I & II.
- Benign tumour : sero-cystic disease of Brodie.

RADICAL MASTECTOMY

Stage I & II of Carcinoma Breast.

Structures removed :

1. Whole breast including nipple and areola and a large portion of skin.
2. All fat and fascia from the lower border of the calvicle to the upper rectus sheath and from the sternum to the anterior border of Lattisimus dorsi.
3. Pectoralis major : sternal portion.
4. Pectoralis minor.
5. Fat fascia and lymph nodes of axilla.

The following structures should be preserved :

1. The axillary vein.
2. The cephalic vein.
3. The nerve of Bell (nerve to serratus anterior).

31. THYROIDECTOMY

Surgical Anatomy : Blood supply.

Arteries :

1. **Superior thyroid :** From external carotid (in relation to external laryngeal nerve).
2. **Inferior thyroid :** From thyrocervical trunk (related to recurrent laryngeal nerve).
3. **Thyroidea ima :** From innominate or aortic arch.

Veins :

Superior thyroid, Middle thyroid] drain into internal jugular

Inferior thyroid veins (Four) drain into innominate.

Subtotal or Partial Thyroidectomy :

I. (a) **Nodular goitre** — toxic.
— non toxic in view of its possible complications.

(b) **Diffuse hyperplastic goitre** — for cosmetic reasons.
A selective subtotal thyroidectomy is undertaken where 3/4 of the gland is removed (when normal thyroid tissue only is preserved).

II. **Diffuse toxic goitre**—approximately 7/8 of the hyperplastic gland is removed.

III. **Toxic nodule**—subtotal or the excision of the nodule is indicated.

Total Thyroidectomy (Near total) :

Indicated in operable carcinoma, where a little thyroid tissue may have to be left to protect the parathyroid artery and gland.

Preparation of Thyrotoxic Patients :

Carbimazole (30-40 mg. daily) is given till the patient becomes euthyroid (takes about 8 to 12 weeks).

Lugol's iodine 30 minims (drops) tds or **potassium iodide** 60 mg. t.d.s. may be used for 10 to 15 days prior to surgery to reduce the vascularity of the goitre and make it softer and easier to handle.

Propranolol may be used in place of Lugol's iodine and should be continued for few days after operation.

Indirect laryngoscopy (to exclude the vocal cord palsy) : Investigations like thyroid antibodies, serum calcium are sometimes necessary preoperatively.

Anaesthesia :

General with endotracheal intubation.

Position :

Patient lies supine with sand bag under the shoulders.

Procedure :

1. Collar incision in the line of skin crease about 3 to 5 cms above the supra sternal notch extending to the lateral borders of two sternomastoid muscles.
2. Skin incision deepen through the superficial fasical and the platysma muscle.
3. Flaps of skin, subcutaneous tissue and platysma are reflected upwards to the level of thyroid notch and downwards to the sternal notch (Joll's self retainng retractor may be applied).
4. Divide anterior jugular veins between ligatures.
5. Incise cervical fascia (investing layer of deep fascia) in the midline.
6. Transverse incision of the pretracheal (infrahyoid) muscles to the carotid sheath—divided high up as ansa hypoglossi supply them from below.

   (In selected cases retraction of the muscles will suffice).
7. Mobilization of the gland : Lateral surface of the gland is cleared, middle thyroid vein (veins) divided between ligatures.

8. Muscles are retracted upwards and laterally, upper pole is delivered in the wound, cricothyroid window is opened.
9. Superior thyroid lease of vessels are clamped between two pairs of artery forceps, applied close to the gland (to avoid injury to external laryngeal nerve). Pedicle is divided. Upper stump is doubly ligated (preferably with transfixing ligature).
10. Lower pole is delivered forwards. Inferior thyroid veins are secured.
11. The lobe is drawn forwards. Inferior thyroid artery is defined and ligated in continuity well away from the gland to prevent injury to the recurrent laryngeal nerve.
12. Isthmus is divided (after opening the space between the isthmus and trachea).
13. Ring of artery forceps around the thyroid.
14. Amount of thyroid decided and excised.
15. Cut surface stitched with catgut.
16. Haemostasis secured.
17. Other side dealt similarly.
18. Wound closure with drainage.

Complications :

I. **Complication of any operation :**

(a) General : cardiac, pulmonary, thrombotic.

(b) Haemorrhage : tension haematoma leading to respiratory obstruction. Urgent evacuation (cut the stitches) is essential.

(c) Infection.

II. **Damage to related anatomical structures :**

(a) Recurrent laryngeal nerve : unilateral or bilateral transient or permanent. Bilateral lesion may need emergency tracheostomy.

(b) Injury to trachea : laryngeal oedema, respiratory obstruction.

III. **Hormonal :**

(a) Tetany (Parathyroid insufficiency) : 2 to 5 days after operation. Usually due to vascular insufficiency to the Parathyroid.

(b) Thyroid crisis.

(c) Thyroid insufficiency.

(d) Late recurrence of toxicity.

32. TRACHEOSTOMY

Indications :

(A) **To relieve acute respiratory obstruction**

1. Laryngeal diphtheria
2. Impaction of a foreign body
3. Oedema of the glottis
4. Bilateral recurrent nerve injury at thyroidectomy
5. Tumours, stenosis or cut throat.

(B) **To improve respiratory function** (a) by reducing the dead space (b) by aspiration of secretions (c) by positive pressure or assisted respiration.

1. Head injuries and coma from any other cause e.g. barbiturate poisoning.
2. Chest injuries (flail chest).
3. Bulbar type of poliomyelitis.
4. Tetnus.

Position :

Place a pillow or a small sand bag beneath shoulders to keep the neck hyperextended.

Anaesthesia :

Local anaesthesia.

Precedure :

1. Vertical incision exactly in the mid line from the upper border of cricoid cartilage downwards for $1\frac{1}{2}$ to 2 inches.

   When circumstances permit a transverse skin incision midway between the cricoid and suprasternal notch is preferable.
2. Incise skin, superficial fascia, platysma & deep fascia, may secure the anastomising veins connecting the two anterior jugulars.
3. Incise deep fascia exactly in the mid line & open the space between the strap muscles.
4. Retract the isthmus of the thyroid gland upwards or ligate & divide, if it is large.
5. Define trachea, by palpating its rings & by its corrugated appearance.
6. Steady trachea by inserting cricoid hook under the cricoid cartilage.
7. Incise trachea through the 3rd or 4th rings vertically. (Sometimes oval hole is also preferred).
8. Introduce tracheal dilator.
9. Introduce tracheostomy tube & remove the dilator.
10. Tie the attached tapes of the outer tube around the patient's neck (Inner tube must be left free).
11. Place a thin veil of gauze over the tracheostomy tube.
12. If necessary, suture skin with one or two stitches.

After Treatment :

Suction of secretions are carried out as & when required. Inner tube is removed & washed in sodium bicarbonate solution every four hours.

Complicatons :

1. Crusting in the trachea.
2. Surgical emphysema—usually due to slipping of the tube into the tissues of the neck.

3. Mediastinal emphysema—due to low intrapleural tension.
4. Tracheal stenosis.

33. EMPYEMA THORACIS

The **treatment** of empyema thoracis may be :

1. **Repeated aspiration** through 8th or 9th intercostal space in between mid axillary and scapular lines.
2. **Interocostal drainage** (under water seal).
3. **Costal drainage** (drainage by rib resection) : usually 2 to $2\frac{1}{2}$ inches of 8th or 9th rib between the posterior axillary and scapular lines is resected; sub-periosteally. Under water seal drainage is instituted. If possible the patient is operated in the sitting position under local anaesthesia.
4. **Decortication**—removal of empyema cavity in toto.

34. AMPUTATIONS

(A) **Indications :**

1. **Dead limb :** e.g. due to
   (a) Severe trauma, especially to major blood vessels.
   (b) Gangrene due to arteriosclerosis, thrombosis, embolism or diabetes.
2. **Lethal limb :** e.g. malignant tumour or gas gangrene.
3. **Useless limb :** The affected limb may be considered inferior to an artificial limb or to no limb at all e.g.
   – flail limb as a result of poliomyelitis.
   – repeatedly infected, by osteomyelitis.

(B) **Types :**

1. **Provisional** : When primary healing is unlikely to occur because of ischaemia or infection.
   (a) ***Guillotine*** : All tissues are divided at the same level.

(b) ***Skin flap type*** : Flaps of skin and deep fascia are raised as with definitive amputations but only light suturing is employed.

2. **Definitive :**

(a) ***End bearing*** : Solid bony end is required with the scar situated anteriorly or posteriorly.

Examples are—***Syme's amputations***—

Tibia and Fibula are divided at the level of the ankle joint and the ends are covered with the skin flaps from the heel.

Gritti-Stokes amputations—

Supracondylar amputation of the femur at the level of adductor tubercle, with the placement of the patella over the cut end to form a broad base.

(b) ***Non-end bearing (Proximal bearing)*** : The weight of the body is not to be taken at the end of the stump.

Examples :

(i) Above knee amputation : Weight is borne by the ischial tuberosity.

(ii) Below knee amputation : Weight is borne by the upper end of the tibia and the knee.

(C) **Level of Amputation :**

(i) Above knee amputations : 10-12 inches from the greater tuberosity.

(ii) Below knee amputations : $5\frac{1}{2}$ inches from the knee joint.

(iii) Above elbow amputations : 8 inches from the acromian.

(iv) Below elbow amputations : 7 inches from the olecranon.

(D) **Operative Technique :**

1. Measure the site of amputation.
2. Avoid a tourniquet if the amputation is for an ischaemic limb.
3. Cut skin flaps and the deep fascia according to the site; too long at first and subsequently tailored. Total length of the flap or flaps should be equal to $1\frac{1}{2}$ times the diameter

(or half the circumference) of the limb at the level of bone section.

- Upper limb—Equal length of anterior and posterior flaps.
- Above the knee—longer anterior flap.
- Below the knee—longer posterior flap.
- Fingers and toes—raquet shaped incision.
- Palmar or planter flaps are better and should always be ample in size.

4. Divide muscles distal to the proposed site of bone section.
5. Ligate vessels as they are encountered.
6. Divide nerve above the level of proposed bone section to avoid a painful neuroma.
7. Divide the bone at the proposed site, with the help of a saw.
8. Suture opposing groups of muscles over the bone end.
   - Close the wound with susbcutaneous tubes and apply a pressure dressing.

(E) **Complications :**

1. Haemorrhage, haematoma.
2. Sloughing of flaps.
3. Infection, ulceration.
4. Adherent scar.
5. Osteomyelitis and ring sequestrum.
6. Painful neuroma.
7. Phantom limb : The feeling that a patient has that his limb is still present after it has been amputated.

(F) **Ideal Stump :**

(i) The stump is well healed and conical.

(ii) The scar is stable, non tender and healthy.

(iii) The skin should be freely movable both on the bone and on the subcutaneous tissue.

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